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AERO DIGEST



ARMY AIR CORPS MANEUVERS

NEW YORK AIR SHOW

Aircraft Radio ■ **Airline Operations**



INTEGRAL-CAST ROCKER BOXES

for better valve cooling, greater rocker arm security and full protection from weather . . . . . .

The integral casting of rocker boxes costs money and requires more time in foundry, in machine shop and in assembly. Yet it is a feature which you naturally expect to find in Pratt & Whitney engines. Its use provides better valve cooling and insures greater security for the rocker arm and valve springs. In addition integral casting protects these essential parts from the weather by making it possible completely to enclose the valve gear, guarding against snow, sleet and rain.

This construction is only one of dozens of Pratt & Whitney features which contribute that dependability for which the famous "Wasp" and "Hornet" engines are universally known.

THE PRATT & WHITNEY AIRCRAFT CO
HARTFORD - - - CONNECTICUT
Division of United Aircraft & Transport Corporation

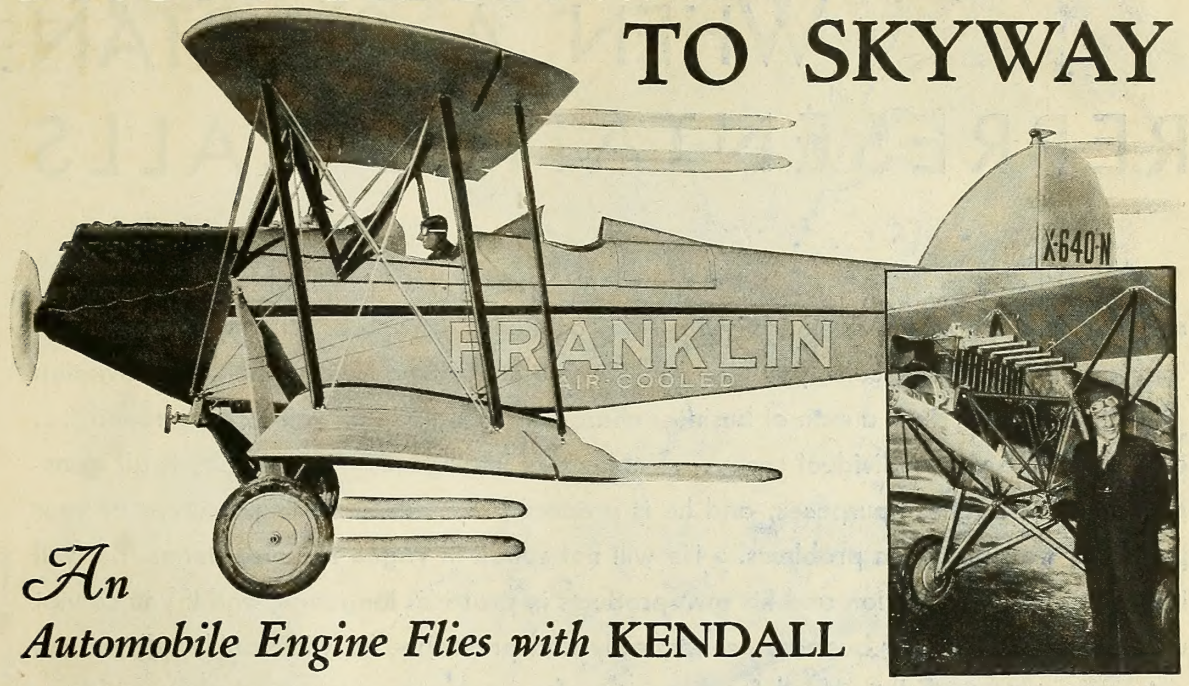
Wasp & Hornet Engines

Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, P. Q.; in Continental Europe by Bavarian Motor Works, Munich; in Japan by Nakajima Aircraft Works, Tokio.

AERO DIGEST, May, 1930. Volume 16. Number 5.

Published monthly by Aeronautical Digest Publishing Corp., at 220 W. 42nd St., New York, N. Y. Yearly Subscription $3. Entered as second class matter July 17, 1922, at the Post Office, New York, N. Y., under the Act of March 3, 1879.

FROM HIGHWAY TO SKYWAY



An Automobile Engine Flies with KENDALL

AGAIN Kendall Oil proves its supreme protection to flying motors—even when a land motor becomes air-minded and furnishes power to a plane!

This unusual test was made by E. A. Johnson, President of Johnson Flying Service, Inc., of Dayton, Ohio, at the request of an engineer of the Franklin Automobile Company.

A Franklin strictly stock six-cylinder automobile motor was mounted in a Waco airplane of conventional design. Such an undertaking called for high speed and consistent power. Protection from overheating was vital—and this important obligation was entrusted to the grade of Kendall Oil specified for this same engine in the Franklin automobile.

The remarkable demonstration of the efficiency of Kendall lubrication is told by Mr. Johnson:

"As you know, automobile engines are set up a great deal closer than an airplane engine and this one was quite tight. However, we ran the engine about five minutes on the ground at 1750 revolutions, then took it up in the air. I am proud to say that it flew very nicely. We speeded it up as high as 2000 revolutions and flew it for over an hour without any sign of the engine getting overheated!

"I think it was quite a remarkable test of Kendall Oil under those conditions—running the engine continuously at wide-open speed. Kendall had a great deal to do with the engine keeping as nice and cool as it did."

To every airplane owner, pilot and mechanic, this test demonstrates the amazing lubricating qualities which have made Kendall Oil famous throughout the realm of the air. For Kendall means motor protection surpassing the needs of everyday flying, unfailing performance even when unusually severe conditions place the responsibility for success squarely on lubrication efficiency.

Kendall Oil for aviation or motor car is made from the world's finest crude—the Bradford Grade of Pennsylvania Crude. It is expertly refined by modern, acidless methods. In use, when the oil supply is maintained at proper level, Kendall will give thirty full hours of service in the air or 2000 miles in your car, without necessity of changing.

For a list of airports where Kendall is now obtainable and complete information about its splendid lubricating qualities, address: Kendall Refining Company, Bradford, Pennsylvania.

BUY AT THIS SIGN
PENZBEST
KENDALL
MOTOR OILS
IT IS YOUR PROTECTION

KENDALL OIL

REFINED FROM 100% BRADFORD GRADE OF PENNSYLVANIA CRUDE

WHEN A SPARTAN REPRESENTATIVE CALLS

Spartan representatives have a definite place in this aggressive business era which demands swift, safe, economical transportation by air. When a Spartan representative calls, you may be sure you are talking to one who knows aviation in all its phases. » He is a man of business character. He will discuss air transportation .... as it applies to your individual case .... frankly and intelligently. His specialty is air transportation for business purposes, and he is prepared to make a thorough survey of your particular transportation problems. » He will not speak in vague technical terms, but will interpret air transportation and his own products in practical language, and if you cannot use an airplane in your business economically and profitably, he will frankly tell you so. » A request on your letterhead for a survey of your business transportation problems involves no obligation.



In addition to three open biplane models, ranging in price from $5675 to $7750 fly away Tulsa, a new, luxuriously appointed cabin monoplane for business purposes is now offered. Full details and descriptive literature on request. Address Dept. AD.

SPARTAN AIRCRAFT COMPANY • TULSA, OKLAHOMA

Say you saw it in AERO DIGEST

"How can I get into Aviation?"



Read this Answer from

A World Famous Trans-Atlantic Pilot

Aviation is waiting for no one! Too many millions of capital are already invested—the demand for air service of *every* kind is increasing too fast. Aviation demands men who KNOW. Men who can DO. Men who can step into the real jobs and command the real salaries. Landing fields, municipal airports, plane and equipment factories, air mail and passenger lines, service and sales organizations—all are leaping ahead in the fastest, most amazing development that any industry has ever known. In such racing, feverish activity, *where* is there any room for a man who has nothing to offer? An empty pocketbook is no drawback—but Aviation has no place, no patience, no *time* for empty hands or empty heads! Aviation is taking off for the greatest non-stop flight in history—and the men who will go along and climb to the top are the men with a foundation of FACTS under them.

WALTER HINTON

Walter Hinton was pilot of the famous NC-4, first plane to fly the Atlantic; he piloted the first plane from North to South America; he was first to fly to the headwaters of the Amazon. During the War he was a crack flying instructor for the Navy. Today—with a course that experts agree is the most complete and practical ever produced—Hinton is training keen-sighted men for the Big-Pay jobs in Aviation.

Get his FREE Book

You Must be 18 or Over

To take an active part in Aviation you must be at least 18 years of age. If you are under 18, please do not ask for Lieut. Hinton's book, because it will not interest you.

You Don't Have to Fly; 40 Different Jobs On the Ground PAY Big Too!

To succeed in Aviation—make BIG MONEY—you need not necessarily be a pilot. There must be many thousands of pilots, certainly. But for every plane that flies, there's an immediate need for trained men in more than *forty* different important jobs on the ground. Construction, motor and instrument experts—airport managers, service foremen, salesmen—all make *real* money. Some of them even bigger pay than pilots earn. But every last one of them must have the FACTS. Today's problem—YOUR problem—is to LEARN Aviation *quick*. And right there is where Walter Hinton is achieving the biggest success of his career.

Get Your Ground Work NOW Right at Home—Hinton Is Ready to Train You

YOU can train at home in spare-time for the best paid jobs in the Industry. Hinton's proved course starts you at the beginning, trains you fast. You get *all* the facts about construction, rigging, motors, repairs, instruments, theory of flight, navigation, commercial Aviation—facts that *every* man must have to intelligently and profitably fill *ANY* job in the Industry. With this Institute's training you'll have your foundation, your *start*, for real accomplishment. Serious-minded—*air-minded*—men are reading and *acting* on the Free Book shown below. We want YOU to have a copy too! Send the coupon NOW.

Aviation Institute of U. S. A.

Walter Hinton, President **1115 Connecticut Ave., Washington, D. C.**



Rush back to Washington *Quick!*

Walter Hinton, Pres. **402, G**
Aviation Institute of U. S. A.
1115 Connecticut Ave., Washington, D. C.

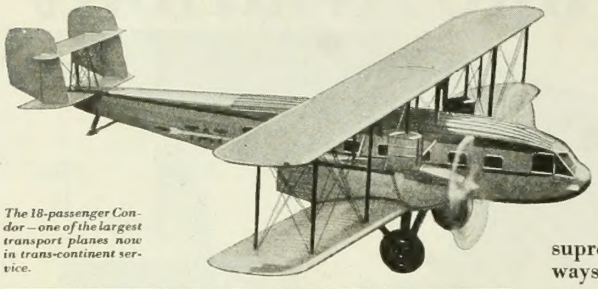
Please send me at once your FREE Book "Wings of Opportunity," showing how I can get into this tremendous field.

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PARTS AND ACCESSORIES · AIRPORT OPERATIONS · AERIAL MAPS

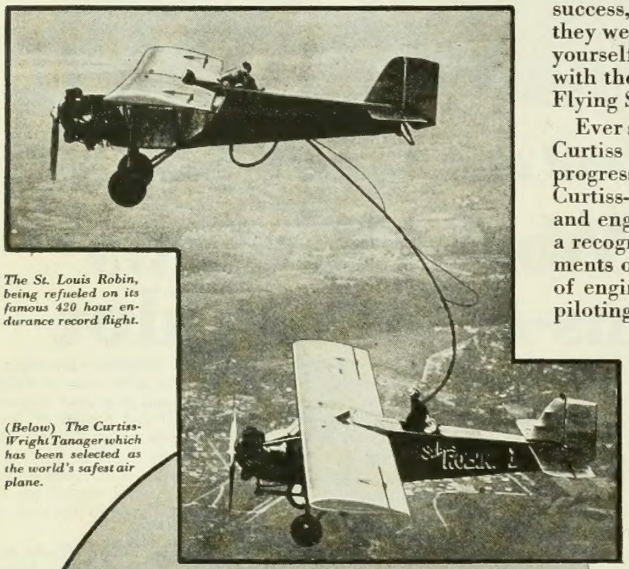


The 18-passenger Condor—one of the largest transport planes now in trans-continent service.

Get a flying with CURTISS

You have read of them and seen them—airmen with supreme confidence, pilots who know their ships and skyways, flyers able to meet every circumstance with ease and success, men who are making aviation history. Yesterday they were average, alert men in many lines of work who, like yourself perhaps, had decided to learn to fly. They enrolled with the world's oldest flying organization—Curtiss-Wright Flying Service. *Today they are Masters of the Air.*

Ever since man first flew, nearly thirty years ago, the names Curtiss and Wright have meant leadership in aeronautical progress. Today the organization which bears the name Curtiss-Wright is the world's largest producer of airplanes and engines, the largest operator and owner of airports, and a recognized leader in training men to serve in all departments of modern commercial aviation. With such resources of engineering knowledge, manufacturing equipment, and piloting skill, it is a natural result that outstanding exploits in the aviation world should be to the credit of this great aeronautical enterprise.

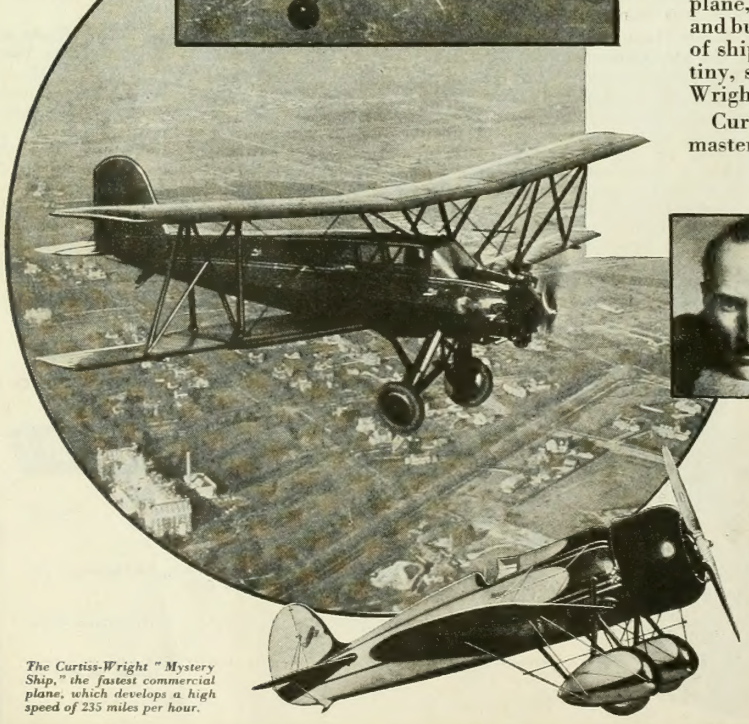


The St. Louis Robin, being refueled on its famous 420 hour endurance record flight.

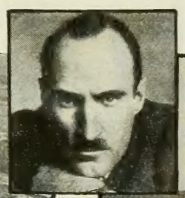
(Below) The Curtiss-Wright Tanager which has been selected as the world's safest air plane.

The St. Louis "Robin," holder of the world's endurance record, was designed and built by Curtiss-Wright. The "Tanager," winner of the $100,000.00 prize in the Guggenheim Safe-Aircraft Competition, is a Curtiss-Wright product. The Travel Air "Mystery Ship," world's fastest commercial airplane, was designed by Curtiss-Wright engineers and built in a Curtiss-Wright factory. Every type of ship, from giant 18-passenger transports to tiny, swift sport planes, is made by Curtiss-Wright.

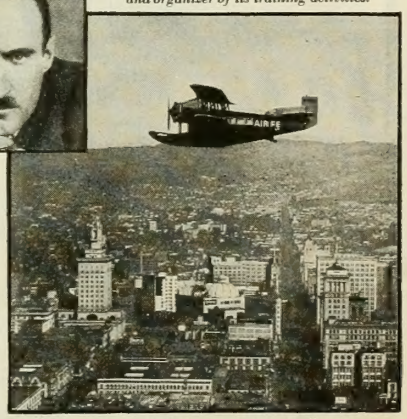
Curtiss-Wright is a producer of aircraft—of master pilots to fly them. Therefore, in its



The Curtiss-Wright "Mystery Ship," the fastest commercial plane, which develops a high speed of 235 miles per hour.



Charles S. "Casey" Jones, world-famous pilot, is president of Curtiss-Wright Flying Service and organizer of its training activities.



Many transport lines standardize on Keystone-Loening Air Yachts for over-water routes. These amphibians land on either water or terrain.

AERIAL PHOTOGRAPHY · GROUND SCHOOL INSTRUCTION

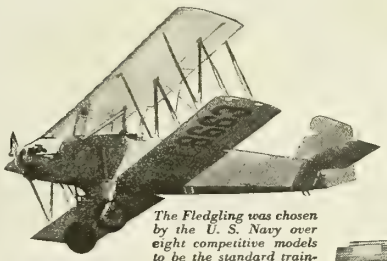
FLIGHT INSTRUCTION · TAXI AND CHARTER SERVICE · SIGHTSEEING TRIPS

start—Master the Air
WRIGHT...

training methods this great organization has a special interest in making students masters of the air who will be a credit to its name. When you enroll at a Curtiss-Wright Flying School, your instructors will be veteran pilots who know how to pass their skill on to you. You will learn about all types of airplanes and engines from the men who built them. You will become familiar with the operation of airports and transport lines. You will learn aviation in all its branches—from the ground up. And when your course is completed, you will be equipped to take your place with the leaders.

Forty important Curtiss-Wright Flying Schools are located at their Air-Bases throughout the United States. One of these is near you. It is not even necessary to give up your present work, for the courses are so arranged that you may learn, if you wish, during spare time on week-days or Sundays. The cost of learning to fly with Curtiss-Wright is reasonable, and to make it easy for you to pay, a term payment plan is at your service, extending the cost over a period of six months to two years, according to the course chosen.

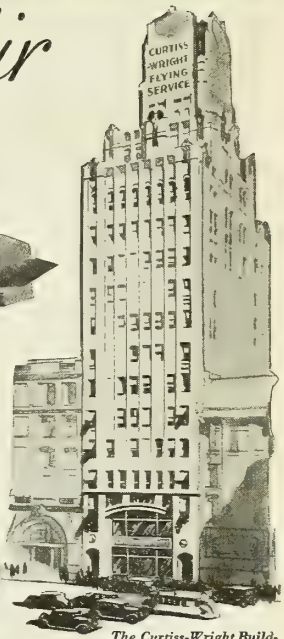
The finest flying season is here and days are long and pleasant. Get your flying start to success now. Choose any convenient Curtiss-Wright school and make up your mind to master the air. If you will fill out the coupon below and check the items in which you are interested, you will be given immediate and interested cooperation. There is no obligation. Write today.



The Fledgling was chosen by the U. S. Navy over eight competitive models to be the standard training plane.

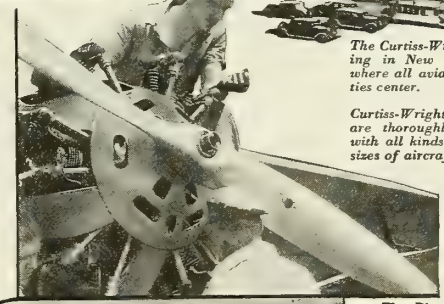


Ready to solo—every minute of training with Curtiss-Wright is pleasant and thrilling.



The Curtiss-Wright Building in New York City, where all aviation activities center.

Curtiss-Wright graduates are thoroughly familiar with all kinds, types and sizes of aircraft engines.



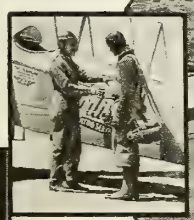


The Pittsburgh, Pa., Airport—one of the 40 flying fields owned or operated by Curtiss-Wright.

CURTISS-WRIGHT
FLYING SERVICE

27 West 57th Street · New York

Curtiss-Wright Flying School students are instructed in all phases of flying. This student is receiving final instructions before entering training plane.





Classrooms of Curtiss-Wright Flying Schools are fully equipped with latest apparatus to make "Masters of the Air."

Curtiss-Wright Flying Schools are located at:—

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Boston, Mass.	Dallas, Texas	Louisville, Ky.	Pittsburgh, Pa.
Bridgeport, Conn.	Denver, Colo.	Memphis, Tenn.	Portland, Me.
Buffalo, N. Y.	Detroit, Mich.	Miami, Fla.	Raleigh, N. C.
Caldwell, N. J.	Hartford, Conn.	Milwaukee, Wis.	Rockland, Me.
Chicago, Ill.	Houston, Texas	Moline, Ill.	St. Louis, Mo.
Cleveland, Ohio	Indianapolis, Ind.	New York, N. Y.	San Francisco, Cal.
			Toledo, Ohio
			Valley Stream, N. Y.

Curtiss-Wright Flying Service AD-5

27 West 57th Street, New York

Gentlemen: I am interested in aviation and would appreciate more information on the subjects I have marked X.

- ☐ Flight Instruction
- ☐ $50 Ground Course
- ☐ New Payment Plan
- ☐ Opportunities in Aviation
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- ☐ Free Curtiss-Wright Booklet

NAME..... AGE.....

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REPAIR AND OVERHAUL PARTS · STORAGE · CROP DUSTING

THE BUHL NAME has been identified with progressive industry since 1833. Buhl products today carry far more than the name alone — they preserve the priceless heritage of almost a century of manufacturing leadership and integrity.

THERE is far more to service than mere ability to serve. There must be an intelligent interest in the customers' program; an eagerness to cooperate in matters which may be but remotely related to the immediate problem;

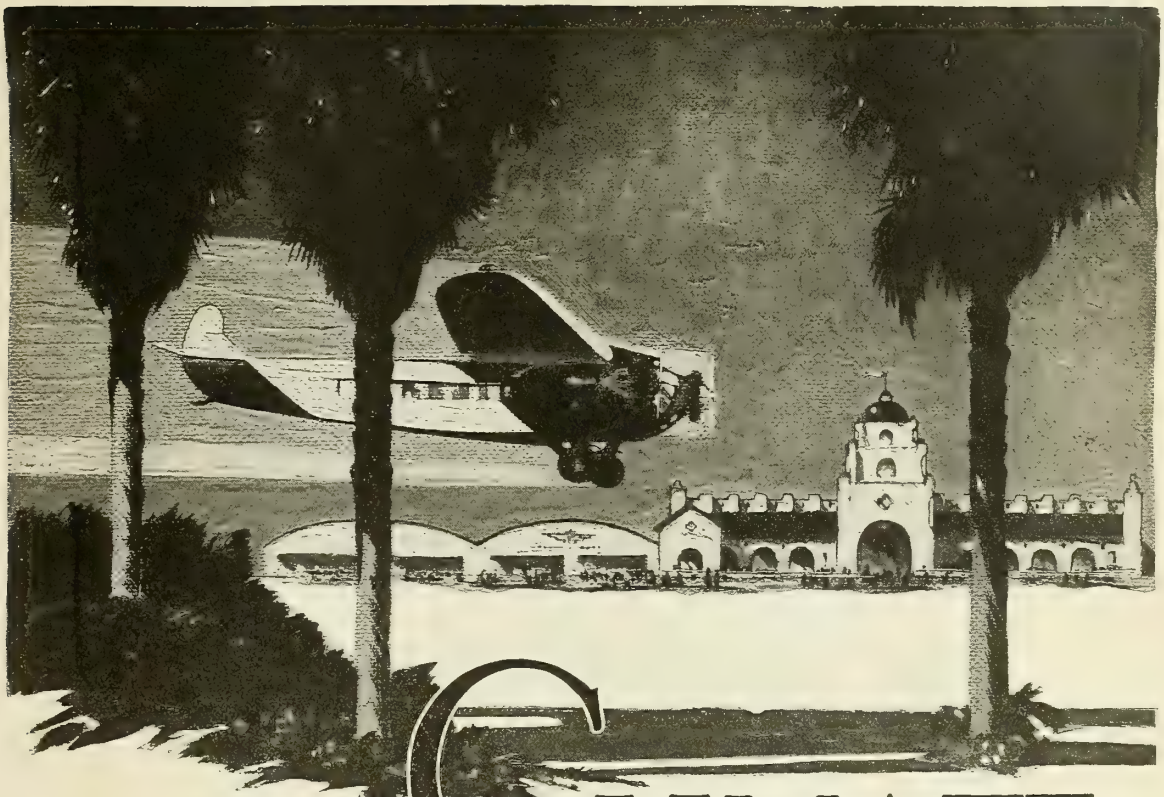


a willingness to devote time and thought and energy to mastering the simplest difficulties of design or production. That is the kind of service that has made the aeronautical division of the Buhl Stamping Company so valuable to a multitude of manufacturers of aircraft engines and parts.

UNDER THE SAME DIRECTION:
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Detroit
BUHL AIRCRAFT COMPANY
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BUHL STAMPING COMPANY
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CLIMATE

The Priceless Contribution of Los Angeles County to the Aircraft Industry

The logical concentration of the aircraft industry in Los Angeles County has developed here an available supply of skilled mechanics, trained pilots and aviation experts unsurpassed in any other American community.

Upwards of 2500 students are constantly in training in 25, or more, aviation schools.

There are 55 airports and landing fields.

18 air-transport lines, including 4 trans-continentals, have their termination here.

Climate is the one factor most vital to the economical operation of the aircraft industry. It is an asset or a liability according to where you locate your plant.

In Los Angeles County, as in no other section of America, the elements favor aeronautics; no extremes of heat or cold... more hours of sunshine... less wind... practically no electrical storms greater visibility... less hazard in the air.

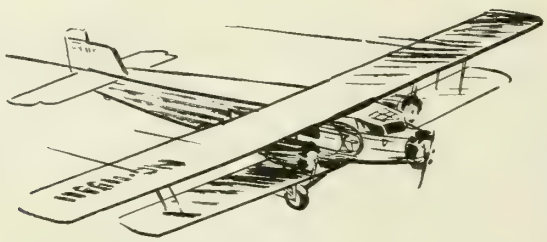
Smaller plant investment suffices here. Labor conditions are ideal. Human efficiency is high. Living conditions are easy. These advantages, peculiar to Southern California, are definitely reflected in the balance sheets of air craft manufacturers in Los Angeles County.

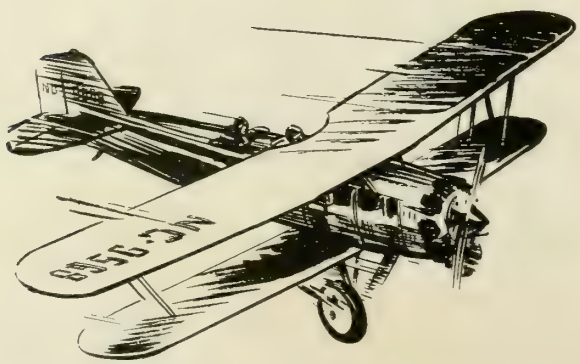
Air-Minded LOS ANGELES *County*

Facts and figures to support the above statements will be furnished upon request. Address: Industrial Department, Los Angeles Chamber of Commerce.

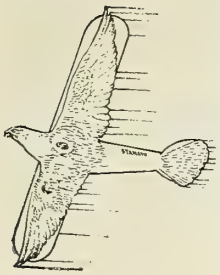
FLIERS THROUGHOUT THE LAND WELCOME STANAVO

Now EVERYWHERE they will be able to get an absolutely uniform and superior aviation engine oil





Say you saw it in AERO DIGEST



NO longer does the problem of getting a uniform engine oil confront and baffle airmen. In Stanavo, the product prescribed by the Stanavo Specification Board, Inc., an organization consisting of experts from the Standard Oil Company of California—Standard Oil Company (Indiana)—Standard Oil Company of New Jersey, fliers are offered an oil guaranteed to be perfect in uniformity and of highest quality wherever purchased.

From San Francisco to New York—clear across the country—Stanavo is already in use by the great trans-continental passenger, mail and express lines. Fliers everywhere hail it not only because of its absolute uniformity and superior quality—but because it is available at all airports and flying fields throughout the nation.

Stanavo, manufactured for maximum performance, is often found, after 25 to 30 hours of use, to be cleaner and better than the average new oil. Try it.

Let us analyze your lubrication requirements.

STANAVO
AVIATION ENGINE OIL

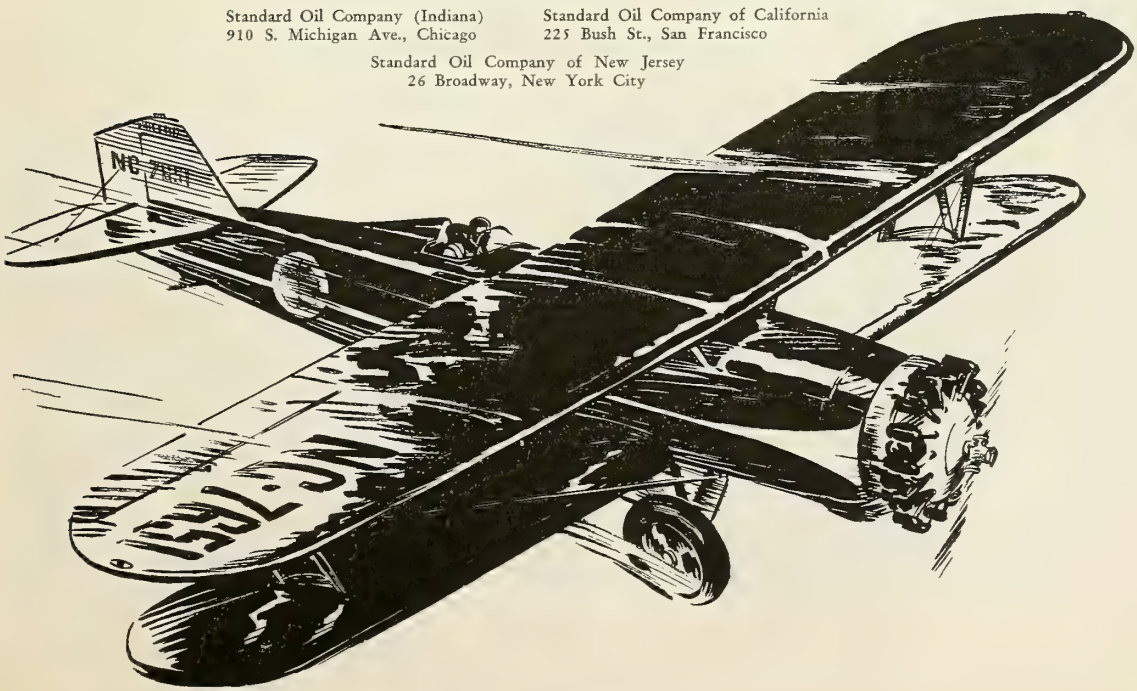
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Organized and maintained by

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910 S. Michigan Ave., Chicago

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Distributors and dealers from coast to coast can match or provide Berryloid colors and make delivery within 24 hours. Refinish your ship in a minimum of time. Use Progressive Aircraft Finishes—chosen by most manufacturers for beauty and durability. Emergency service to manufacturers, or immediate delivery to fleet and individual plane owners is assured by the following distributors and their dealers:

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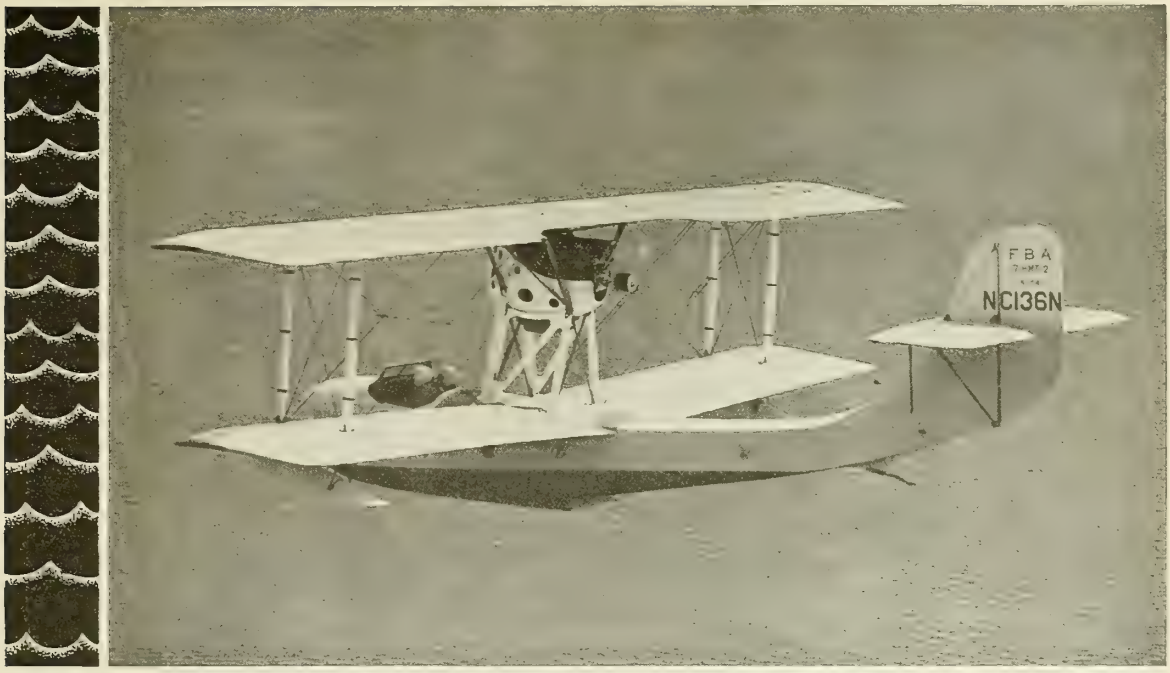
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Manufacturer of Progressive Aircraft Finishes

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Varnishes Enamels Lacquers
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The Viking Amphibian and Flying Boat designed by Louis Schreck, builder of the Schreck F. B. A., famous French plane with a record of 6,000,000 miles behind it without a structural accident.

Both the Viking and Kittyhawk Planes are made by

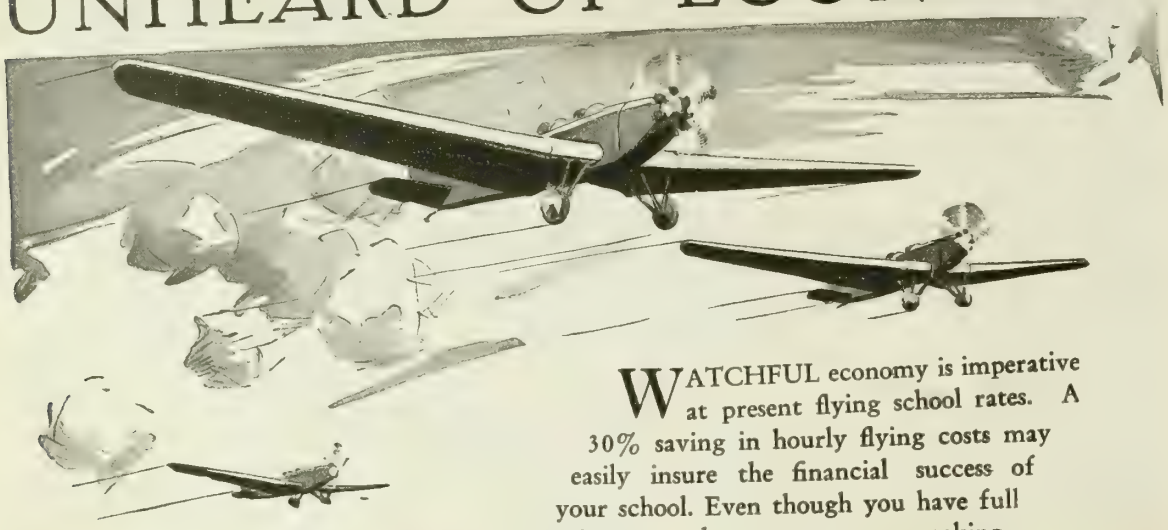
THE VIKING FLYING BOAT COMPANY

For full particulars write to The Viking Flying Boat Company, 89 Shelton Avenue, New Haven, Connecticut or Causeway Island, Miami, Florida.



Pictured above—The Kittyhawk three place biplane designed for safe, steady flying . . . the Kittyhawk has been granted "Approved Type Certificates" as a land plane and as a sea plane.

UNHEARD OF ECONOMY



WATCHFUL economy is imperative at present flying school rates. A 30% saving in hourly flying costs may easily insure the financial success of your school. Even though you have full equipment, there are money-making reasons why you should consider making the Aeromarine Klemm AKL-25 standard on your field.

For, with its unheard-of economy of operation (30% below that of the average training plane), go all the superior qualities of one of the world's most popular and successful light planes for training and for sport flying.

Born as a glider—the AKL-25 flies itself. Powered by the famous, dependable Salmson 40 horsepower, nine-cylinder radial—or by the equally well known, sturdy LeBlond 60 horsepower, five-cylinder, radial engine (*) . . . these planes are built to stand rough handling and to win friends for your school by their ease of control. Department of Commerce Approved Type Certificates Nos. 121, 203 and 204.

(*) For primary training, the AKL-25 powered by the Salmson 40 h.p. engine, sells for $3350, flyaway, Keyport, N. J.

For secondary training and for cross-country work, the AKL-60, powered by the LeBlond 60 h.p. engine, sells for $3500, flyaway, Keyport, N. J.

Equipped with pontoons and powered by the LeBlond engine, the AKL-60 sells for $4500, flyaway, Keyport, N. J.



AEROMARINE KLEMM CORPORATION

GENERAL MOTORS BLDG. 1775 BROADWAY NEW YORK CITY

Why bother with deaf-and-dumb signs?



SAYS an instructor to his student—"Now remember, when I put out the right hand, I want right rudder. The left hand—left rudder. Savvy?" .....

But why go to the trouble—when it's so much easier, so much pleasanter, and so much *clearer*—to use Communicating Helmets!

Let the engine roar, let the wires whistle, you have only to *whisper* through these finely-functioning Spalding Sets—and the student, or passenger, will hear you perfectly. And there won't be any misunderstandings.

Made of velvety-soft brown capeskin—lined with chamois—with Spalding patented ear puffs and metal attachments, and detachable metal tubes . . . Spalding Helmet Sets can be used with the communicating tubes, or without.

Spalding single helmets with communicating tubes—$13.50. And if it's all right with you to have the student talk back—get a *double* set, at $25.00.

Spalding has a complete stock of flying equipment. It is carried by all Spalding stores, and at many of the leading fields. Or let us send you the free catalog.

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AVIATION EQUIPMENT

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Turning Seconds Into Miles and MILES into SMILES

THE AMERICAN EAGLE WAY!

American Eagle airplanes have a way of getting close to the heart. Anything does when it proves its friendship by faithful performance in deed and steadfastness.

Once you own an American Eagle you settle back to enjoy your dollars well spent—and to earn more, too, for that's what American Eagles do best when put to that sort of task.

There's inbuilt comfort and ease of riding in American Eagles—they take you there surely, speedily and you're as fresh as the dew when you alight at the journey's end.

It requires a vast amount of experience to engineer and build such craft as American Eagles. Take the Model 430 (pictured below). It's a cabin monoplane with more leg room than your auto; more glass, too, for visibility; adjustable forward seats; three doors; baggage room for a month away from home, and so many other features we'll have to show you personally.

Here's an airplane ideally suited to any sort of aerial activity. It steps along at a 106 to 109-mile-an-hour clip, lands easily and takes off snappily. And you can ride 650 to 700 miles on a tank of gas!

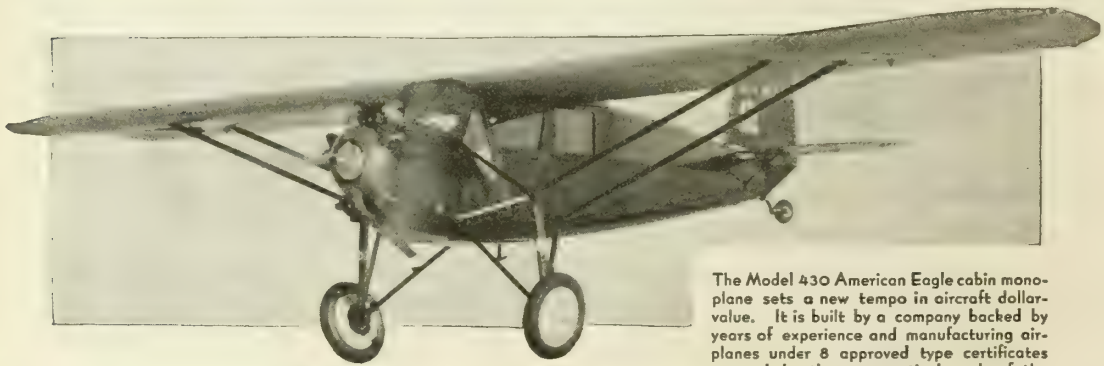
Drop us a wire or letter and let us tell you more about this plane, or, if you're interested more in an open cockpit biplane for three, let us tell you about Model 201, a real "honey", with Kinner power.

Model 430
4-place cabin monoplane

Approved Type Certificate No. 302 with Continental Seven (165 h. p.) engine.
Priced $6995 flyaway Kansas City.

Approved Type Certificate No. 301 with Wright Whirlwind Five (165 h.p.) engine.
Priced $7395 flyaway Kansas City.

An attractive dealer proposition is available in certain territories



The Model 430 American Eagle cabin monoplane sets a new tempo in aircraft dollar-value. It is built by a company backed by years of experience and manufacturing airplanes under 8 approved type certificates granted by the aeronautic branch of the department of commerce.

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AIRCRAFT CORPORATION
FAIRFAX AIRPORT KANSAS CITY, KANS.
"MASTER OF THE SKIES"

AMERICAN EAGLE AIRCRAFT CORP.
6 Fairfax Airport, Kansas City, Kansas

Please send full information with descriptive literature concerning the complete line of American Eagle Airplanes.

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Address _____
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New

WE TAKE PRIDE in announcing to Transport Lines that we are now producing the Visual Tuned Reed Indicator for airplane guidance from Radio Beacons.

Built in the laboratories of Julien P. Friez & Sons with the utmost care and precision under the guidance of its original designers—it is Radio's latest contribution to the success of Aviation—guided by his tuned reeds, the pilot may navigate the Radio Boulevards of the air—with a comfort that no other instrument yet devised can assure.

Prices and further information on the Tuned Reed Visual Indicator will be promptly furnished on request.

CONSOLIDATED INSTRUMENTS

SPECIAL GLIDERS for the new sport of gliding—we announce brand new lightweight panels with Air Speed Indicator graduated 20 to 80 miles per hour—and Low Altitude Sensitive Altimeter—special instruments for the special needs of GLIDING.

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Baltimore St. and Central Ave. - Baltimore, Md.
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Aircraft Control Corp. - Philadelphia, Pa.
Factory Branch - - - Wichita, Kansas
Sales, Service and Repairs - 221 S. Lawrence St.



For Dixieland's 365 Flying Days A Year

Service—unfailing service—was imperative.

For Daily Passenger and Express Routes from the World Port of New Orleans to distant inland Terminals—

For scheduled runs from metropolitan New Orleans to the beaches and resort playgrounds of the great blue Gulf—

For work with experimental racing planes that are shooting at World's Records, where just good enough is by no means nearly good enough—

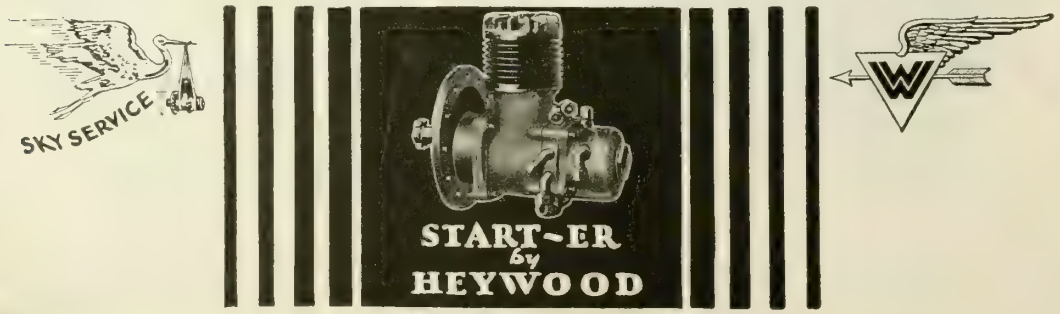
For the ships devoted to primary and advanced student training—

For the ultra-dependability that is demanded alike by the routine of multi-stop schedules and the exactions of experimental research—

For all of these, Wedell-Williams needed *the* best. That is why the South's leading air service choose Heywoods.

In luxuriously appointed cabin transports and in amphibian air yachts, in flashing business fly-abouts and in the slim racing projectiles of their testing fields, Wedell-Williams have installed 15 Heywood starters to date.

SKY SPECIALTIES CORPORATION, 3651 Hart Avenue, DETROIT, MICHIGAN





13 more Fairchilds to speed the mapping of an Empire from the air

FLYING high over rich farm lands, populous industrial centers, villages, lakes, streams and wooded areas, the surveyors of modern Canada are charting the entire vast reaches of the Dominion. The Department of National Defence and Department of the Interior are jointly responsible for this gigantic pioneering venture. It is the most extensive aerial mapping undertaking ever attempted.

For the extremely exacting work of flying these surveys, Fairchild airplanes are being used exclusively. Three years' operation in Canada has proved them suitable for Canadian conditions and for the even more exacting demands of aerial photography in the Dominion. They are stable; capable of sustained flight with heavy loads at high altitudes; operating on pontoons, skis or wheels; operating from small fields or lakes and giving uninterrupted service for months at a time even though stationed hundreds of miles from a repair base or source of replacement parts.

During March, seven Fairchild "71's" were delivered to the Department of National Defence and six more are on order for April delivery. These orders raise to 34 the number of Fairchild cabin monoplanes purchased by the Department and are eloquent testimony of their suitability for Canadian conditions.

They also use their Fairchilds for official transport, coast patrol, air mail and many miscellaneous purposes. In addition, more than forty Fairchilds are owned and operated in Canada by commercial operators and industrial organizations.

May we send you more information about the Fairchild 71, the airplane that has pioneered commercial aviation not only in Canada but Mexico, Peru, Chile and the United States?

FAIRCHILD AIRPLANE MANUFACTURING CORP.
FARMINGDALE, LONG ISLAND, NEW YORK
Plants: FARMINGDALE, N.Y.; HAGERSTOWN, MD.; LONGUEUIL, P.Q., CANADA
Export Offices: 122 EAST 42ND STREET, NEW YORK CITY
Division of The Aviation Corporation



Seven Fairchild cabin monoplanes ready for delivery to the Department of National Defense

FAIRCHILD 71 A.T.C. 89 SEVEN PLACE

Performance: Top Speed, 132.5 m. p. h.; Climb, 675 ft. p. m.; Disposable Load, 2,370 lbs. ***Specifications:*** Wasp 420 h-p. engine and metal propeller. Note complete equipment: Eclipse inertia starter, booster magneto, Bendix disc wheels and brakes, compass, turn and bank indicator, airspeed indicator, altimeter, tachometer, oil pressure and temperature gauges, navigation lights, leatherette upholstery with limousine trim and appointments, heavy soundproofing, six passenger seats, non-shatter glass, carpet, heaters, ventilator, baggage compartment. Price, landplane, $18,900 flyaway Farmingdale.

FAIRCHILD

AIRPLANES

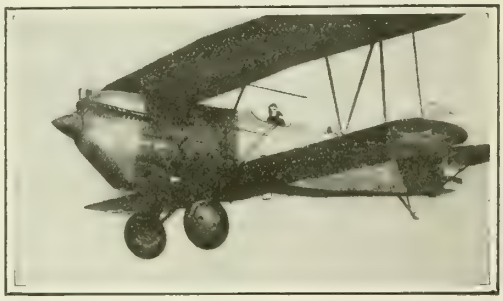
Say you saw it in AERO DIGEST



PURSUIT—Curtiss P-1C

ON THE

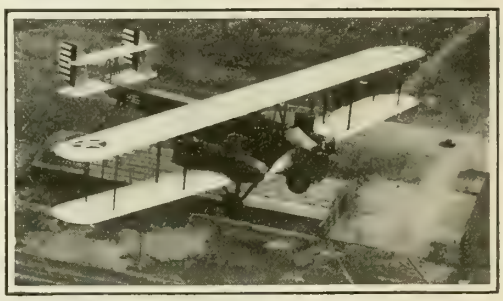
The Annual Air Corps Maneuvers



OBSERVATION—Curtiss O-1E

AT Mather Field, California, the U. S. Army Air Corps has just completed its annual Air Maneuvers. The crack fighting units of the Air Corps, with more than 160 of its finest planes, participated, for the Maneuvers represented both an intensive study of tactical problems and a thorough demonstration of the year's progress in the training of personnel and the development of equipment.

For the first time in Air Corps history, all four offensive branches of Army Aviation—Pursuit, Observation, Attack, and Bombardment—were combined in the Maneuvers. *In all four branches* Curtiss military aircraft (and Curtiss engines) are standard fighting equipment of the Air Corps. The Curtiss P-1C Pursuit, the O-1E Observation, the B-2 Bomber, and the A-3B Attack types, constituted more than 50% of all aircraft taking part in the Maneuvers. No other aircraft manufacturer was represented at the Maneuvers in more than *one* branch. These figures are convincing evidence of the versatility and effectiveness of the Curtiss Group Engineering System in producing high-performance aircraft to meet the exacting requirements of Military Aviation.



BOMBARDMENT—Curtiss B-2

CURTISS AEROPLANE &

Offices: GARDEN CITY, N. Y.

A · DIVISION · OF · CURTISS ·

WESTERN FRONT



THE MANEUVERS—a striking aerial photograph showing some of the 160 planes taking part in the Maneuvers, flying over Mather Field. All of the aircraft in the picture are Curtiss-Wright products.



ATTACK—Curtiss A-3B



P.S. And "behind the lines" here in the Experimental Laboratories at Garden City, Curtiss engineers, in co-operation with the Air Corps, have just produced the XBT-4, a new Basic Training plane powered with the Curtiss D-12 engine. In addition, they are busily engaged in the development of several new types of fighting aircraft, still finer than those now in service. Next year's Maneuvers will again reflect the progress that is vitally necessary to continued supremacy of our air forces.

MOTOR COMPANY, INC.

Factories : GARDEN CITY and BUFFALO, N. Y.

W R I G H T · C O R P O R A T I O N

Douglas

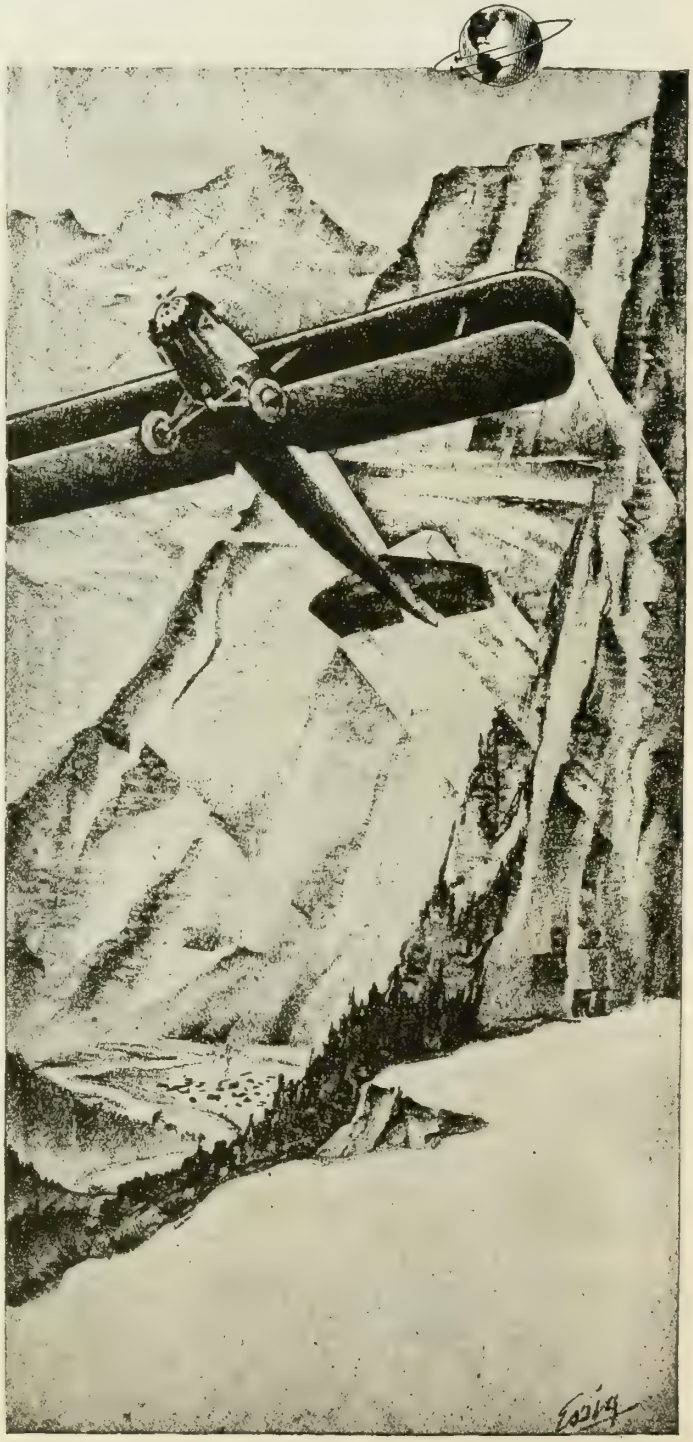
from the Pinnacles of the Andes!

LAPAZ AIRPORT, in the heart of the Bolivian Andes mountains, 14,000 feet up above the level of the sea, provides a setting where the take-off performance of a plane under any kind of load is tested to the maximum.

Yet, from this field, among the pinnacles of the mighty Andes mountains, a standard Douglas plane carrying a load far beyond normal made the take-off in less than one foot per pound of useful load carried!

Under the skillful control of Colonel Pablo Sidar of the Mexican Army, a Douglas O-2 type observation plane under load consisting of a full load of gasoline or 336 gallons, 25 gallons of oil, his mechanic and all personal baggage... the whole totaling 2900 pounds of useful load... left the ground with ease after a run of only 2500 feet.

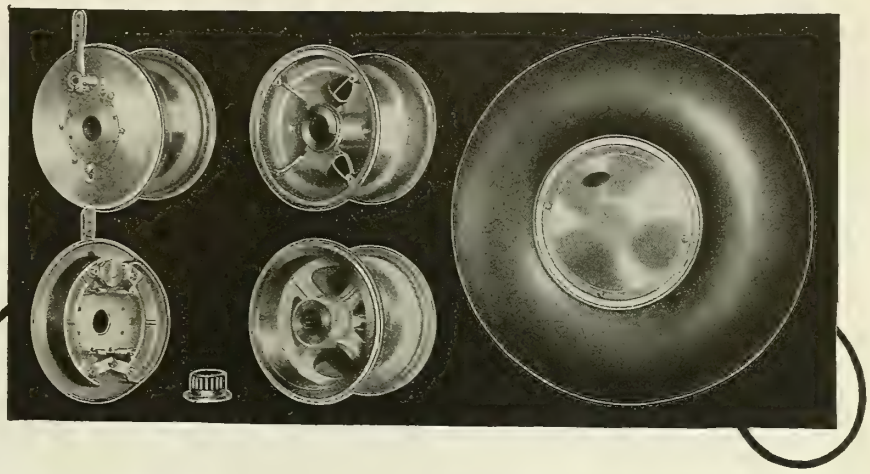
Where runway footage counts, where performance beyond specifications is paramount, in such situations one fact expresses itself in no uncertain manner *...Douglas Means Dependability!*



DOUGLAS AIRCRAFT CO. INCORPORATED
Santa Monica California

Constant Development Insures Our Continued Leadership







Designers and manufacturers of Airplane Wheels and Brakes, Axles and Complete Undercarriages, Oildraulic Shock Struts, Tail Wheel Assemblies, Pontoons, Flying Boat Hulls, Wing Tip Floats, Airplane Skiis, Gasoline Tanks, Oil Tanks and Oil Coolers.

AS America's leading producers of aircraft parts, our policy is one of constant development and improvement. Our engineering staff, composed of national authorities in their respective fields, is responsible for the broad acceptance of our products throughout the industry. Units designed and manufactured by the Aircraft Products Corporation are used in the construction of airplanes produced by 72 American manufacturers. Our manufacturing facilities, geared for mass production on aircraft parts exclusively, and our low selling expense due to the volume of our business and a wide diversity of products, establishes the Aircraft Products Corporation as your logical source of supply. We invite you to participate in the economies of this mass production.

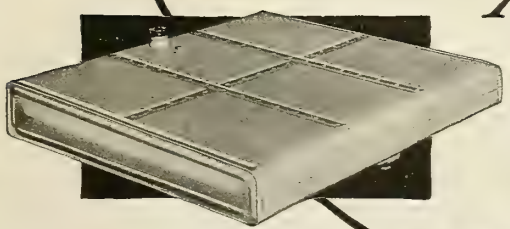
Aircraft Products Corporation of America

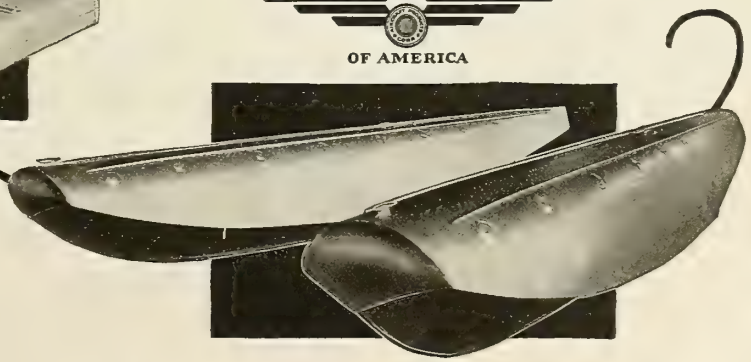
Detroit, Michigan

Aircraft Products

CORPORATION

OF AMERICA





THIS IS AN AMPHIBION YEAR!

NO LIMIT NOW
to Amphibion Sales!



4 Ireland models . . . $4,890 to $23,000

Until this year, sales of amphibions were restricted to the wealthy . . . those who could, and would, pay $18,000 and up.

But now Ireland sweeps away the cost-hurdle . . . brings amphibion ownership within the reach of thousands instead of hundreds . . . with the first complete, well-balanced line . . . the first price-range that covers the entire gamut of purchasing power!

You dealers have never before faced such possibilities of profit as now exist in the 1930 Ireland line . . . two new ships . . . Privateer Model 1, a 2-place flying boat at only $4,890 . . . Privateer Model 2, a 2-place Amphibion at $5,550; the lowest-priced Amphibion ever produced . . . a new 4-place cabin Amphibion at $18,000 . . . and the famous 5-place Amphibion de Luxe at the new reduced price, $23,000.

This is more than merely an amphibion year . . . 1930 is IRELAND'S year! Ireland dealers are receiving cooperation that is putting them, and the Ireland line, in a dominating position.

Established aircraft dealers of substantial financial standing are invited to request information covering the Ireland dealer policy, which assures mutual satisfaction and profit. Ireland Aircraft, Inc., Garden City, Long Island, New York.

A Model for Every Air-Minded Purse

Privateer, Model 1: 2-place Flying Boat $4,890

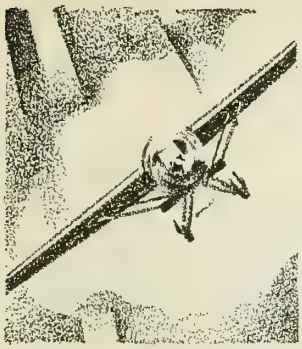
Privateer, Model 2: 2-place Amphibion $5,550

4-place Cabin Amphibion $18,000

5-place Ireland Amphibion de Luxe $23,000

IRELAND AMPHIBIONS

Say you saw it in AERO DIGEST

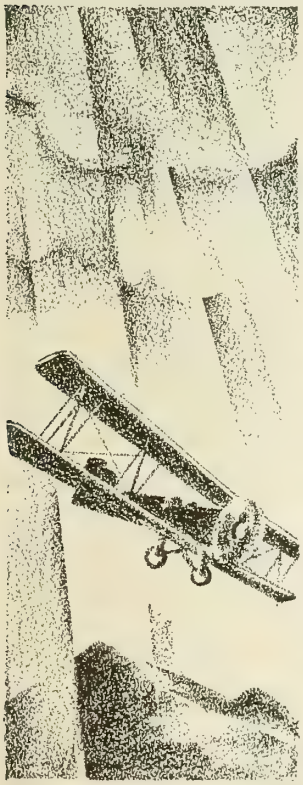


Material	Specific Gravity	Young's Modulus of Elasticity lbs. per sq. in.	Ultimate Tensile strength lbs. per sq. in.	Yield Point lbs. per sq. in.	Fatigue Limit lbs. per sq. in.	Specific Tensile Strength*	Specific Yield Point*	Specific Fatigue Limit*
Alcoa Aluminum 17ST	2.8	10,000,000	58,000	35,000	15,000	20,710	12,500	5,360
Chrome-molybdenum steel	7.9	30,000,000	100,000	60,000	40,000	12,650	7,600	5,060

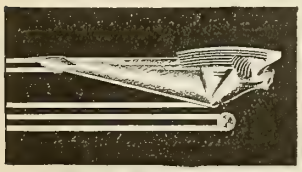
Technical Data Which Give Definite Proof that Alcoa Aluminum is the One Metal that Flies Best.

*The specific tensile strength, specific yield point, and specific fatigue limit are equal to ultimate tensile strength, yield point and fatigue limit divided by the specific gravity.

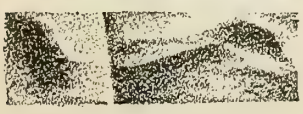
Replacing other metals, Alcoa Aluminum offers either of these two advantages...



ALCOA ALUMINUM



THE ONE METAL THAT FLIES BEST



1. Equal strength with less weight

2. Equal weight with greater strength

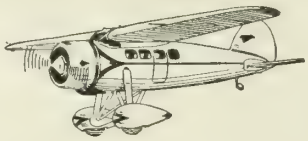
Because metal will not shatter, is non-combustible, has greater strength and can be fabricated exactly and duplicated in manifold shapes, it is more and more replacing wood for plane construction.

Among the metals considered by the airplane designer and builder, one stands out. In the past few years the use of the light, strong Alloys of Alcoa Aluminum has increased tremendously, both as to the amount used in a single plane and the number of companies employing them.

These alloys have the combination of advantages so long sought for planes—both light weight and great strength. When a metal part is built to a *specified strength* it can be made *lighter* with Alcoa Aluminum. When a part is to be built to a specified *weight* it can be made *stronger* with Alcoa Aluminum. The chart above gives technical data on this point.

The fabricating technique for Alcoa Aluminum is no more difficult than that for steel. The machinery required for either is much the same. Our nearest office will gladly supply you with full information on the application and fabrication of Alcoa Aluminum and its alloys for any definite purpose you may have in mind. ALUMINUM COMPANY *of* AMERICA; 2484 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA ALUMINUM



The Lockheed "REGISTER"

SINCE JANUARY 1, 1930

the following distinguished persons and corporations in the United States and abroad have taken delivery of or have placed orders for new Lockheeds:

COLONEL CHARLES A. LINDBERGH

AMELIA EARHART

LIEUTENANT JAMES DOOLITTLE
Shell Petroleum Corporation

COLONEL ARTHUR C. GOEBEL

LIEUTENANT A. HAROLD BROMLEY
for the Tacoma Chamber of Commerce

GENERAL ROBERTO FIERRO
Director of Civil Aviation, Mexican Government

CAPTAIN JOHN A. MacCREADY
Shell Oil Company of California

JOHANNA FAY SHANKLE of Boston

MONSIGNOR E. G. EORDOGH
for the Hungarian-American Ocean Flight

ASA CANDLER, JR., of Atlanta

JOHN HENRY MEARS of New York

ALASKA-WASHINGTON AIRWAYS
Seattle (two planes)

NEW YORK, RIO & BUENOS AIRES LINE, INC. (two planes)

DETROIT AIRCRAFT

FORT AND CAMPAU STREETS, DETROIT

CHANIN BLDG., NEW YORK • ROOSEVELT BLDG., LOS ANGELES

LOCKHEED AIRCRAFT CORPORATION
EASTMAN AIRCRAFT CORPORATION
RYAN AIRCRAFT CORPORATION
AIRCRAFT PARTS CO., INCORPORATED
PARKS AIR COLLEGE, INCORPORATED
PARKS AIRCRAFT CORPORATION
BLACKBURN AIRCRAFT CORPORATION
AIRCRAFT DEVELOPMENT CORPORATION
MARINE AIRCRAFT CORPORATION
GROSSE ILE AIRPORT, INCORPORATED
GLIDERS, INCORPORATED
DETROIT AIRCRAFT EXPORT CORP.



NO OTHER PART OF AN AIRPLANE IS MORE PRECISION-BUILT

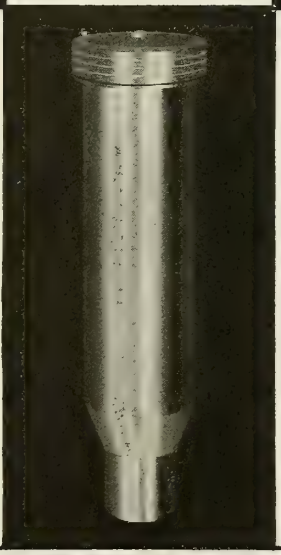


The cylinders of Aerol Military Struts are machined in one piece from a single chrome-nickel-steel extruded or tube forging specially heat-treated in modern electric furnaces under pyrometer control. The possibility of flaws in the metal or errors in heat-treating are eliminated.

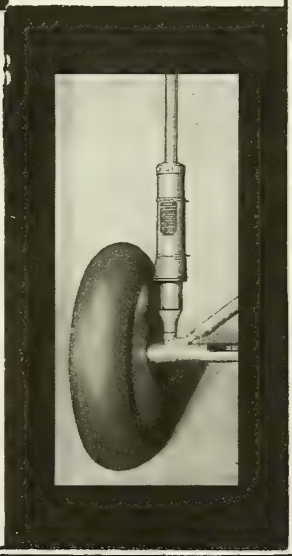


The finished cylinder is exactingly machined to rigid limits. One one-thousandths of one inch is the maximum tolerance allowed, and rigid inspection prevents the passing of any cylinders not meeting these requirements.

The piston assembly also represents the highest quality of materials and workmanship. The piston is made from special chrome-nickel-steel extruded or tube forging and the carefully fitted head is of slow-wearing gun metal. The special packing holds a perfect seal throughout years of active service.



The finished strut combines fine materials, workmanship and superior design. No other type of landing-shock absorber can equal the operating efficiency and long life of these struts. That is why there are more Aerol Struts in use today than any other make.



BUILT BY THE CLEVELAND PNEUMATIC TOOL CO., CLEVELAND

AEROL *shock absorbing* **STRUT**

Taking the southern air with PAN AMERICAN

THESE are days when business and pleasure are summoning thousands to Central and South America. New markets and old culture beckon. And whether the objects are trade or travel, Pan American Airways add keen delight to the journey.

Flying South with Pan American, you take off from Miami in the fast, comfortable Sikorsky Amphibions. Powered with two "Wasp" 420 H. P. engines these luxurious ships can fly and maneuver on either engine. They are converted from landplanes to seaplanes in a matter of seconds.

The use of a sizeable fleet of Sikorsky Amphibions by Pan American is typical of the care with which this famous line provides for the complete comfort . . . and swift transport . . . of its patrons.

And the Sikorsky Amphibion is equally valuable for use in the States. With deep water much closer than landing fields to the business centers of many cities, the "S-38" is saving time for transport lines, business organizations and owners in private life. A folder, recently issued, has some interesting things to say on this point. May we send you a copy? Sikorsky Aviation Corporation, Bridgeport, Connecticut. Division of United Aircraft & Transport Corporation.

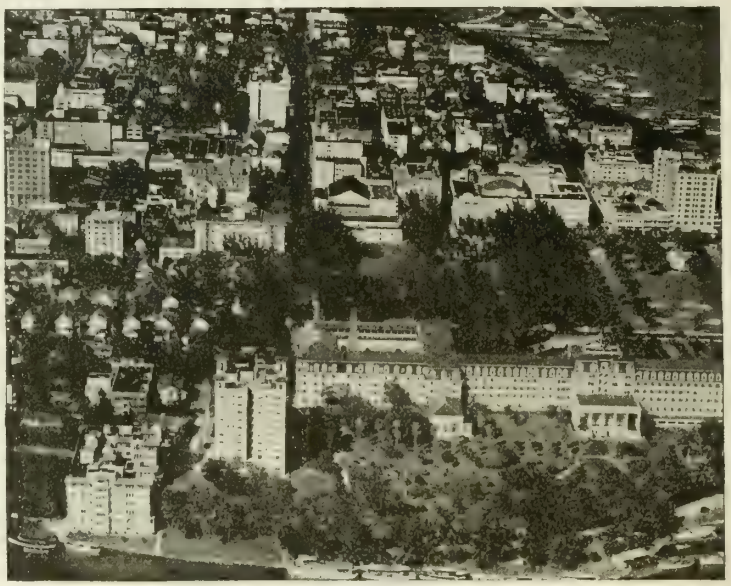


Photo Fairchild Aerial Camera Corp.

Pan American's panorama varies from urban Miami to the densely wooded tropic wilds

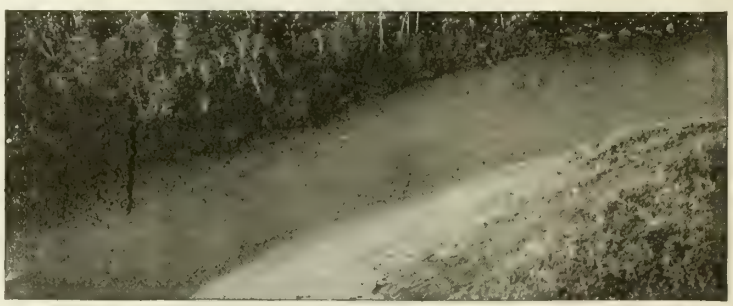
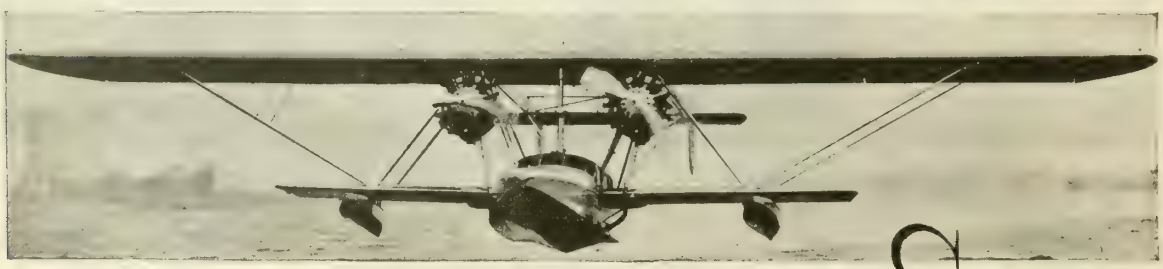


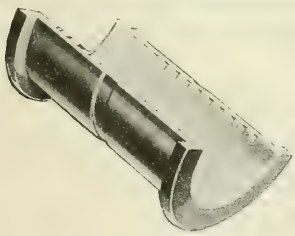
Photo by Johnson Brothers



SIKORSKY AMPHIBION

The Longest Air Line in the World Relies Upon Federal-Mogul for Unfailing Bushing Performance





The Complete Federal-Mogul Line

Bronze-Back, Babbitt-Lined Bearings

Steel-Back, Babbitt-Lined Bearings

Die Cast Babbitt Bearings and Bushings

Bronze Bushings—Bronze Washers

Bronze Castings—Babbitt Metals

Bronze Cored and Solid Bars

Die Castings

Licensed Under
Letters Patent of the United States
No. 1,455,939; No. 1,302,838
No. 1,302,584; No. 1,340,337

IN SELECTING a motor for their trimotor transport to run between Chicago and San Francisco, the Boeing Air Transport, Inc., conducted an exhaustive study of motors, which included a test of every component part. This air route—the longest air line in the world—demands unconditional good performance of every motor part, for the most severe flying conditions must be endured—flying from sea level to 12,000 feet; with ground temperatures ranging from 20 below zero to 120 degrees F.; a top flying speed of 138 m.p.h.; a 20 hour night and day flight for every journey.

Just as has been proven in other outstanding aircraft engines, Federal-Mogul Parts stood the gaff—just as did all other parts of the Pratt and Whitney Hornet engine chosen by Boeing for this outstanding air route.

For dependable bearing and bushing performance choose Federal-Mogul.

Mogul FEDERAL

THE FEDERAL-MOGUL CORPORATION • DETROIT, MICHIGAN



"There's a lot more flying left in *that* oil . . . . . it's *Quaker State!*"

LONG, long after the ordinary oil reaches the shot-to-pieces point, Quaker State Aero Oil holds its tough, oily body—and keeps right on giving your motor that sweeter, silkier lubrication.

Quaker State lasts and lives longer because there's an extra quart of *lubrication* in every gallon of it—a whole quart more of friction-fighting lubrication than you get in the gallon of ordinary oil. The reason? Because of the way Quaker State Aero is made, the way it is refined.

Ordinary refining leaves in every gallon of oil, one quart or more that is of little or no value as a lubricant to your motor—it is little more than a quart of waste as far as lubrication is concerned.

But you don't get this waste in Quaker State, for Quaker State Aero Oil is *super*-refined—carried a step further than ordinary oils. This extra step removes the quart of waste that ordinary refining leaves in. In its place you get a quart of the finest *lubricant*—a quart more than you get in the gallon of ordinary oil—you actually get an *extra* quart in every gallon of Quaker State!

And—*mighty* important—every single gallon of Quaker State Aero Oil is made from 100% pure Pennsylvania Grade Crude Oil. There's no better—it's the finest the world produces!

Ask for Quaker State at your airport—and you'll get the sweetest lubrication you ever found for your motor, anywhere. It's remarkable how it retains its body. It will stand heat that would cripple an ordinary oil—it's the greatest aero oil that ever kept a motor out of mischief. Try it!

AERONAUTICAL CHAMBER OF COMMERCE

Tune in on the Quaker State Program every Friday evening at 10 o'clock E. S. T.—coast-to-coast Columbia Network.

Get that extra quart in every gallon of

QUAKER STATE AERO OIL

TRADE MARK REG. U. S. PAT. OFF.



QUAKER STATE OIL REFINING CO.

Oil City, Pa.

. . . . . *Other Pure Pennsylvania Products are:*

QUAKER STATE MEDIUM MOTOR OIL · QUAKER STATE MEDIUM HEAVY MOTOR OIL
QUAKER STATE HEAVY MOTOR OIL · QUAKER STATE COLD TEST
QUAKER STATE TRACTOR OILS

Guaranteed 100% PURE PENNSYLVANIA OIL
The highest grade oil in the world

Learn to Fly

for

$25



Thousands Are Flying Gliders; Alexander Trainer Is Rugged

Gliders are the safest and most economical means of learning to fly. They teach you the controls of an airplane at a speed within your experience. Under our club plan twenty persons put up $25 each, buy their own glider and become qualified glider pilots for less than the cost of one hour of airplane instruction. It is easy to form a club. We tell you how.

Designed especially for training and sport the Alexander Trainer glider is rugged and safe. One wing, inverted to simulate actual flight conditions, supports 1731 pounds of sand in the testing laboratory. This is 14.4 times the strain exerted in normal flight.

To make the Trainer still more husky the fuselage is of welded steel tubing; made in two sections to facilitate hauling. Points which bear the greatest strain are strongly braced. The rear section is of triangular construction.

The Trainer is produced under airplane manufacturing conditions by the aircraft company which ranks third in the past three years' licensed airplane production. Modern factory production permits the low price and high quality of workmanship and material.

High altitude performance is a particularly attractive feature of the Trainer. Clubs are using it as a primary glider 6,200 feet above sea level and even higher where gliders could hardly be expected to fly at all. That is the reason the Trainer excels at sea level.

Those who intend to tow the Trainer behind an automobile will appreciate the rugged and quickly detachable landing gear. It lessens shock and helps the student maintain balance while practising prior to flight. Wear on the skid is eliminated. It is priced at $40.

Make Money forming clubs and selling gliders. Get into the most profitable branch of aviation. Become a dealer. Sales of three gliders make you $225. We help. Mailing the coupon below is the first step.

We have a plan for automobile agencies which brings big profits from operating a glider school or club with but small investment and no increased overhead. Let us tell you about it.

ALEXANDER AIRCRAFT CO.

403 Alexander Industries Bldg.
Colorado Springs, Colo.

$375.00

F.O.B. FACTORY

Gliders are allotted in the order that $100 deposits are received. Whether you want to organize a club or glide your own, you assure early delivery by sending your deposit now.

ALEXANDER AIRCRAFT CO.
403 Alexander Industries Bldg.
Colorado Springs, Colo.

Please send me your folder describing the Alexander Trainer and telling how to form a glider club.

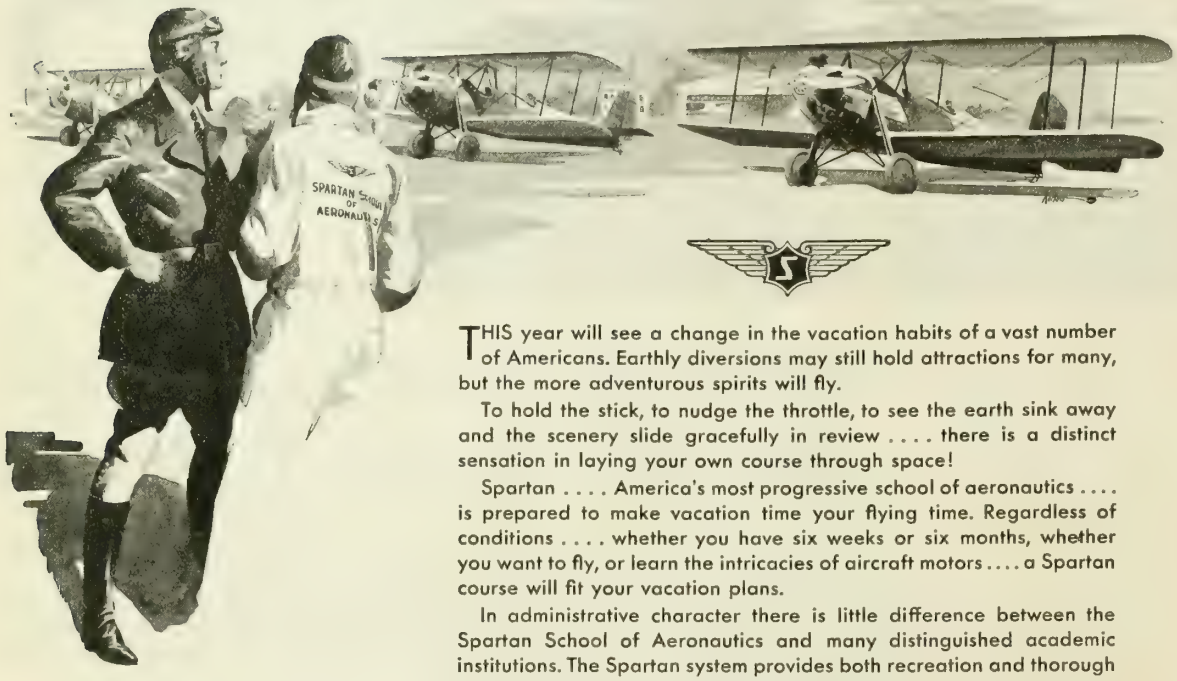
Interested in dealership ☐ In organizing a school ☐

Name .....

Street No. .....

City ..... State .....

»VACATION TIME IS FLYING TIME



THIS year will see a change in the vacation habits of a vast number of Americans. Earthly diversions may still hold attractions for many, but the more adventurous spirits will fly.

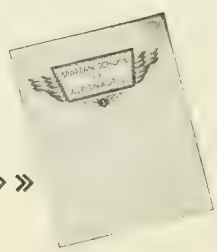
To hold the stick, to nudge the throttle, to see the earth sink away and the scenery slide gracefully in review .... there is a distinct sensation in laying your own course through space!

Spartan .... America's most progressive school of aeronautics .... is prepared to make vacation time your flying time. Regardless of conditions .... whether you have six weeks or six months, whether you want to fly, or learn the intricacies of aircraft motors .... a Spartan course will fit your vacation plans.

In administrative character there is little difference between the Spartan School of Aeronautics and many distinguished academic institutions. The Spartan system provides both recreation and thorough aeronautical education. Discipline prevails during instruction periods, wholesome entertainment is provided regularly, and normal social life is not interfered with.

Spartan student-pilot instruction is surrounded with safeguards. New, licensed flying equipment is maintained in excellent condition by licensed mechanics. Flying instructors are licensed .... men of character and broad experience .... and the school is one of few in America licensed by the U. S. Department of Commerce as transport ground and flying school.

Especially is correspondence invited with parents anxious to place son or daughter in a dependable school of aeronautics. For complete information sign and mail the coupon.



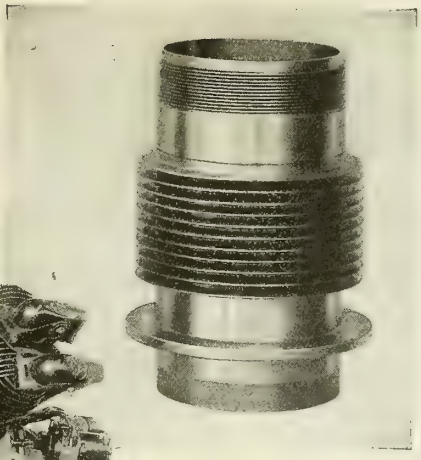
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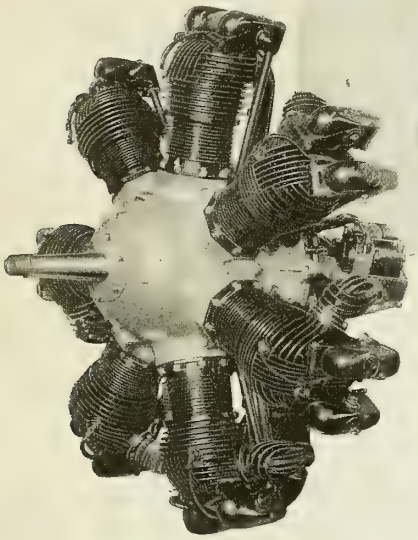
SPARTAN SCHOOL OF AERONAUTICS, Tulsa, Okla.
Gentlemen: Please send me your 32-page illustrated booklet describing all Spartan courses.
Name_____ Age_____
Address_____

««

SPARTAN SCHOOL OF AERONAUTICS
TULSA, OKLAHOMA

Upper right view shows Nickel Alloy Steel cylinder used in Axelson Type B 150 H P airplane engine, manufactured by AXELSON AIRCRAFT ENGINE CO., *subsidiary of the Axelson Mfg. Co., Ltd., Los Angeles, Calif.*





Dependable materials are the best assurance of dependable performance

Nickel Alloy Steel Parts in* AXELSON *Aircraft Engine

Cylinders Cam
Cam countershaft
Valve tappet Cam roller pin
Rocker arms
Rocker arm shafts
Fuel pump drive shaft
Oil pump drive shaft
Oil pressure pump drive gear
Oil pressure pump driven gear
Scavenging pump drive gear
Shaft for oil pump driven gear
Magneto drive shaft
Starter clutch Knuckle pin
Piston pins

17 PARTS

of tough NICKEL ALLOY STEEL *insure dependability in Axelson Aircraft Engines*

THE wide experience of the Axelson Manufacturing Co. in producing precision equipment has proved to be of great value in designing and constructing the Axelson type B aircraft engine. This 150 H P engine was awarded the Department of Commerce Approved Certificate No. 16, and is known for its dependable power and economical operation.

The fact that the cylinders in Axelson engines are ground and machined from a forging of heat-treated Nickel Chromium Steel indicates that careful selection of materials is a major consideration with Axelson engineers and designers. Seventeen additional vital parts of Axelson engines are also made of Nickel Alloy Steel.

There is no better testimonial to the superior combination of mechanical properties, the high strength per unit of weight, and the uniform dependability of Nickel Alloy Steels than the fact that they are used for highly stressed parts of leading aircraft engines all over the world.

Nickel
FOR ALLOY STEEL

SEND FOR LIST OF AVAILABLE PUBLICATIONS ON NICKEL AND ITS ALLOYS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

A School for Men

who must make the most of their money and their time

ONE of the oldest and largest schools in America — first-class equipment — thoroughly experienced teachers—located at a $2,000,000 airport. Ideal year-round flying weather. You save WEEKS by coming to this school, and the following prices show how you save money.

We Will Pay Your Railroad Fare

We will pay railroad fare from your home to Dallas if you enroll for either a Transport or a Commercial Course; one-half railroad fare if you enroll for Private Pilot's Course.

Ground School Course

Complete ground school training in a period of only three months. Prepares for a choice of many good positions at airports, airplane factories, etc.

$100

Master Mechanics Course

Every new airport—every airplane manufacturing plant —requires men with the qualifications this course provides. You can earn big money in aviation as a master mechanic and we teach you in less time for less money.

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Private Pilot's Course

20 air hours—dual, solo and ground school training. Requires about four weeks. Qualifies you for Private Pilot's license.

$385

Commercial Course

50 air hours—our most popular course. Open and cabin ships. Complete ground course; cross-country trips; acrobatics; night flying. Qualifies you for a Commercial Pilot's license.

$795

Transport Course

200 air hours—the complete course of flying training. Full ground course includes meteorology and air navigation; air training in open and cabin ships up to 6-place types. A wonderful course, for which we must soon increase the price.

$2500

Special Courses:

10 air hours $180
15 air hours $295
10 air hours, 3-place cabin instruction $250
10 air hours, 6-place cabin instruction $350

DALLAS
Aviation School
Love Field, Dallas, Tex.

Mail this Coupon!

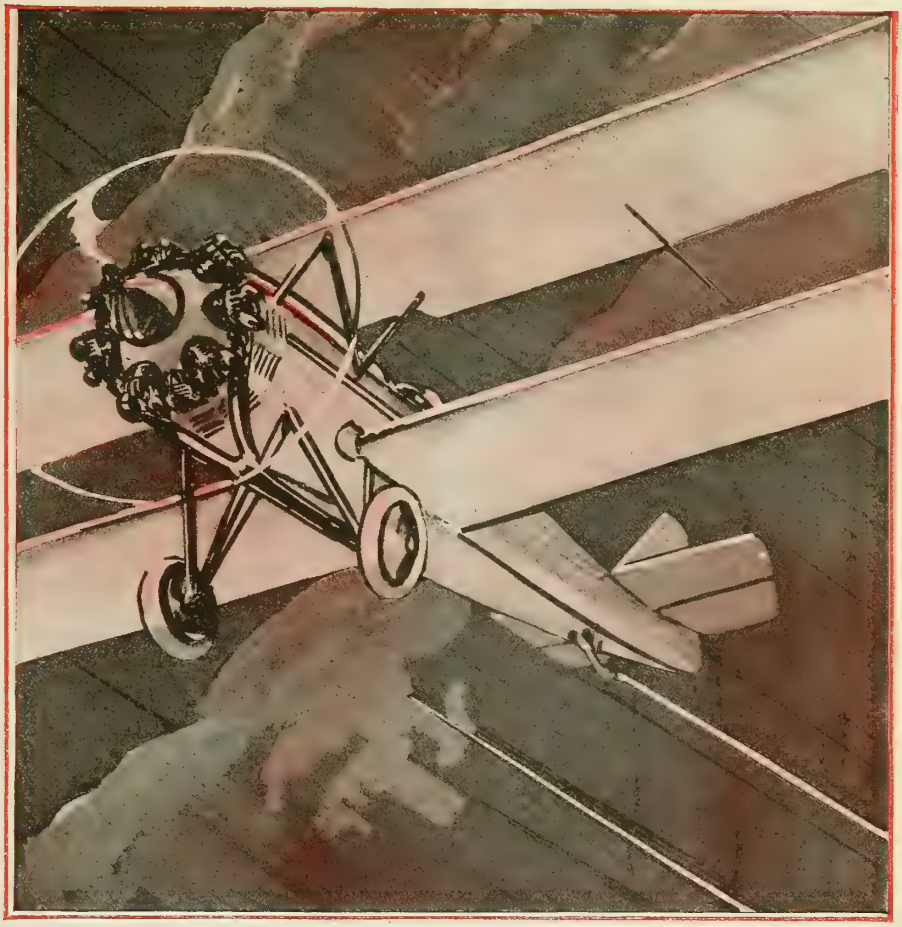
Dallas Aviation School, Department A,
Love Field, Dallas, Texas

Send complete information to:

Name .....

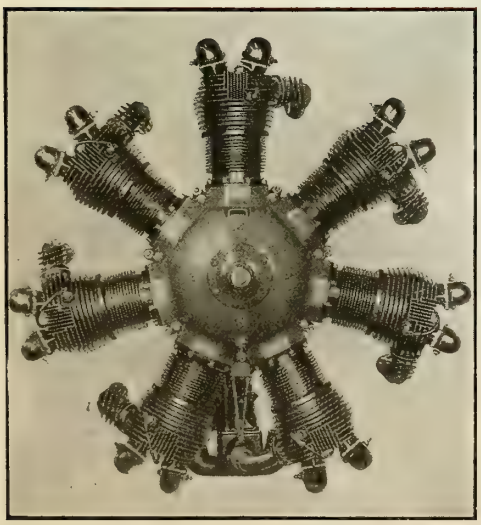
Address .....

.....



SWALLOW

----adopts AXELSON ENGINES exclusively



Completing exhaustive tests extending over a period of several months, the Swallow Airplane Company of Wichita, Kansas, has completed arrangements whereby Axelson Airplane Engines will be used exclusively in the Swallow 3-place Training Bi-plane and the Swallow 2-place Sport Bi-plane. This combination will permit greatly reduced production costs by Swallow and Axelson and will identify Swallow Planes as the outstanding product in their class.

The Axelson 7-cylinder Airplane Engine is manufactured under Approved Type Certificate No. 16.

AXELSON AIRCRAFT ENGINE CO.
General Offices and Plant:
Randolph Street at Boyle Avenue
LOS ANGELES, CALIFORNIA



Announcement

The demand for the Aeronca C-2 has exceeded our most optimistic expectations. Actual orders have made it necessary to increase production to a point where it will probably exceed that of any other plane being manufactured today.

In keeping with our policy of pioneering the huge mass market . . . of building a plane which the average man can fly safely *and buy easily* . . . we take great pleasure in announcing that the Aeronca C-2 has been reduced from $1880 to $1495, Flyaway Cincinnati.

AERONCA

America's Fastest Selling Plane . . . at an even Lower Price

Just three months ago the Aeronca C-2 was introduced to the aviation world. Its initial appearance quickly proved-to even the most skeptical that it *was* possible to achieve glider safety and sport plane performance . . . a combination desired by all—especially the public

At St. Louis, during the International Exposition, the Aeronca startled the industry by literally jumping off the concrete ramps after running seventy-five feet or less. Nearly a hundred different pilots took their first hop in it . . . and came down grinning with enthusiasm. The Aeronca's inherent stability, its rapid climb, its easy maneuverability, its eleven to one gliding angle and its 30 mile an hour landing speed had them sold . . . and then some. And when they witnessed that economy run . . . one hour and seventeen minutes on two gallons . . . the Aeronca was proclaimed the sensation of the show.

The news spread rapidly! At Detroit . . . during the All-American Show . . . those who had heard the good word, wanted to be shown. And, after seeing loops, spins and rolls, sideward flying, deliberate stalls at hedge-hopping altitudes and dead-stick gliding demonstrations . . . all with the same plane—an Aeronca C-2—they began to buy.

Then, Stanley C. Huffman established a new light plane distance record by flying from Cincinnati to Roosevelt Field with the 30 h. p. motor consuming less than $9.00 worth of fuel—in spite of head winds.

Since then it's been hard to satisfy the demand. Almost overnight the Aeronca has become the fastest selling plane in America . . . not because it is a cheap airplane . . . but because it is the ***safest*** possible airplane at any price. We shall be glad to mail additional information on request.

AERONAUTICAL CORPORATION of AMERICA

LUNKEN AIRPORT . . . . . CINCINNATI, OHIO



WILCOX-RICH VALVES

What are

SALT-COOLED VALVES

and why?

Salt-cooled Valves are dominant factors in developing high-temperature cooling. Wilcox-Rich is the only manufacturer licensed to make Salt-Cooled Valves.

Salt-Cooled Valves Dissipate Heat

A salt-cooled valve has a hollow stem partially filled with salts which are molten at engine operating temperatures. The rapid reciprocation of the valve agitates the mixture, resulting in a purely mechanical transfer of heat from the valve seat—where temperatures are high, to the valve stem—where heat may be dissipated to the valve guide bushing and the cylinder block. The effective surface available for heat dissipation is thus increased by about six hundred per cent.

Advantages of Salt-Cooling

The salt-cooled valve has the following advantages:

Lower operating temperatures. Salt-cooled valves run "black" under conditions where un-cooled valves operate at "red" heats.

Lessened tendency toward detonation and pre-ignition, due to lower operating temperatures.

Elimination of valve burning, distortion, pitting and wear, will greatly lengthen life.

Improves the fuel consumption by lessening the tendency for detonation with lean mixtures.

. . .

Owing to these important advantages salt-cooled valves offer an opportunity to improve the performance of aviation engines; generally without alterations to the existing design.

manufactured by

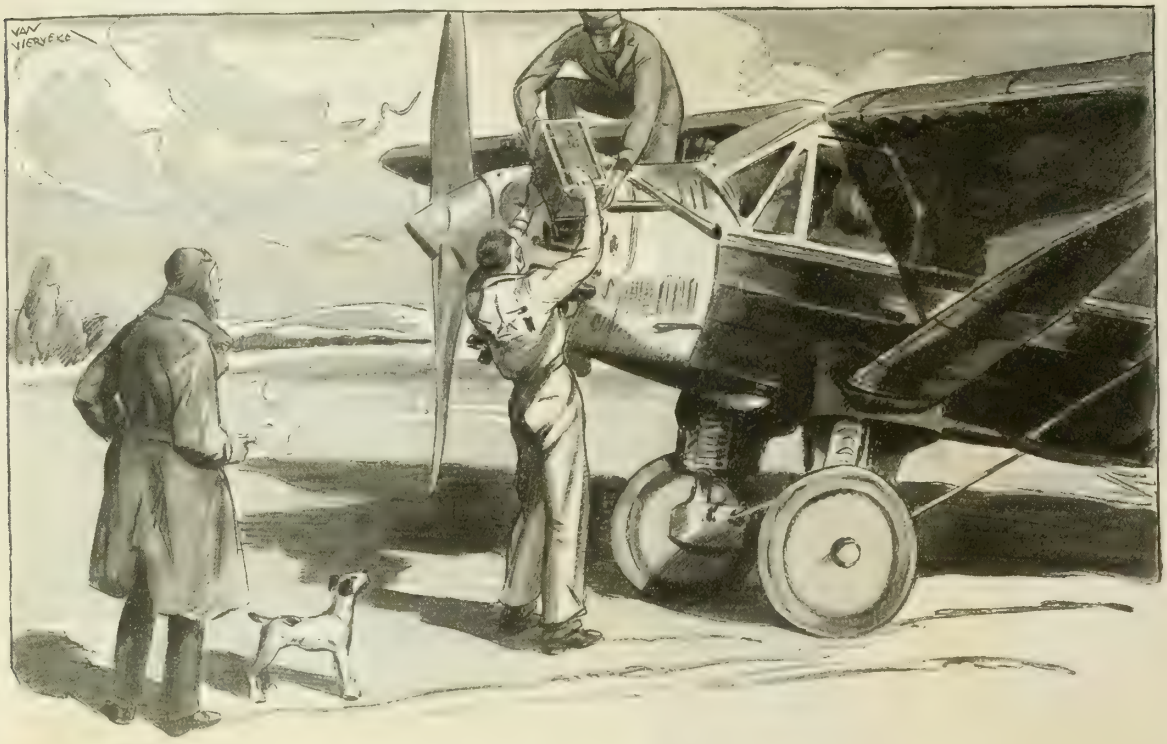
WILCOX-RICH CORPORATION, *Detroit*

World's Largest Manufacturers of Automotive Valves

Sold for Replacement Purposes Exclusively Through

McQUAY-NORRIS MFG. CO. - - ST. LOUIS *and*

KING QUALITY PRODUCTS CO. - - ST. LOUIS



CANS OF INSURANCE

THE red and black cans of -TP- Aero Motor Lubricating Oil contain the best insurance against the many kinds of engine trouble caused by faulty lubrication. This insurance makes flying safer.

-TP- Oils are new—the latest development in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded, produced from pure, paraffine-base crude by a process for which patents are pending.

This process has marked advantages over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold test.

In terms of performance this means uniform viscosity at all working temperatures, minimum carbon deposit and ignition trouble from fouled spark plugs, easy cold priming, immediate oil pressure, perfect lubrication winter and summer, on the ground or at high altitudes—a maximum of safe flying hours.

A handsome, practical *Pilot's Log Book* sent free on request.

-TP- Aero Valve Spring Lubricant



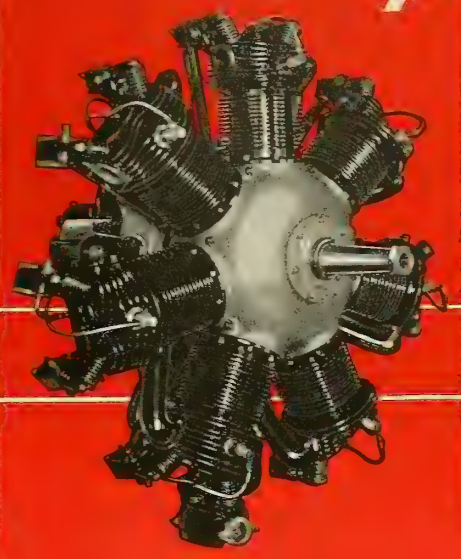
Also -TP- Aero Rocker Arm Lubricant

TEXAS PACIFIC COAL AND OIL COMPANY
FORT WORTH, TEXAS
New York St. Louis Los Angeles

-TP- AERO MOTOR LUBRICATING OIL
REG. U. S. PAT. OFF.

2781

AMERICA'S BEST BUILDERS OF LIGHT PLANES FURNISH WARNER POWERED PLANES





Scarab

Warner's wonderfully efficient design, Warner-precision manufacturing and Warner performance have won a place for themselves to the point where the foremost builders of light Airplanes in this country furnish planes Warner-equipped.

These men whose very business stability is based on their knowledge of the performance-characteristics of every engine in their power class have placed their unconditional stamp of approval on the Warner engine.

The holder of many of the most coveted records, including both the world's Speed and American Altitude records for light planes, Warner engines have set a stiff pace for others to follow.

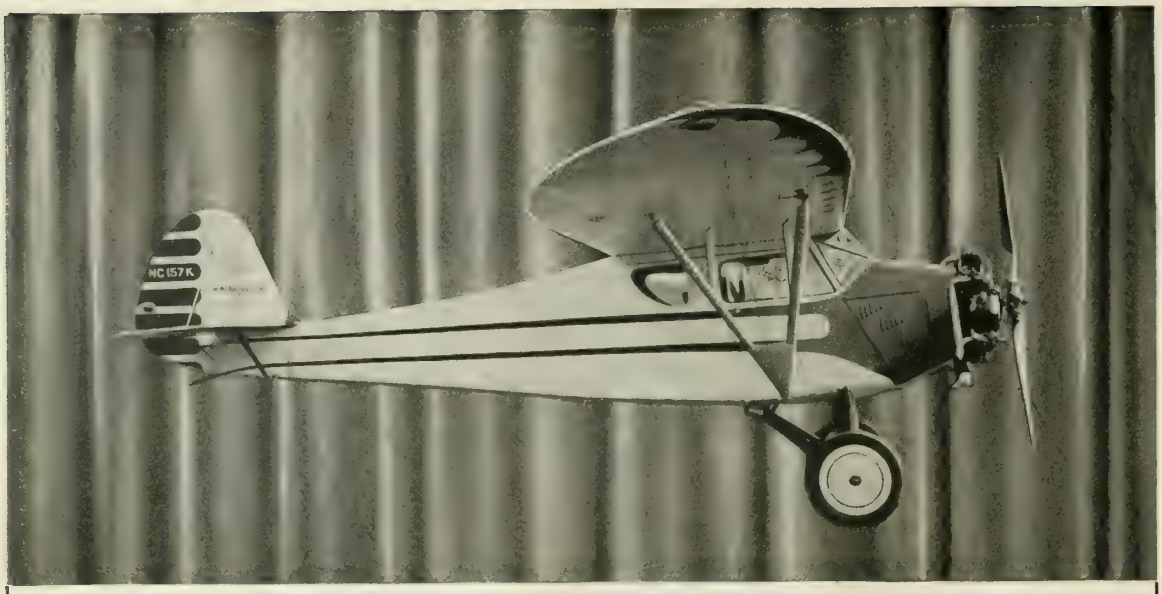
The new Warner service program insures too that every owner of a Warner-equipped plane, will get the very best kind of service that the entire industry affords.

We would like to give you detailed information on both the 5 and 7 Cylinder Models. Write for it.

WARNER AIRCRAFT CORPORATION
DETROIT MICHIGAN

WARNER Scarab ENGINES

Say you saw it in AERO DIGEST



New Super-Performance

Under All Conditions for

The Monocoupe "90"

at $3375.00

TAKE it point for point—a plane that is comfortable in all weather without getting dressed up to look funny. It's companionable—you can smoke and talk, no weather too rough, one man moves it in and out the hangar, a power plant that requires less concern over motor service and maintenance than one gives his automobile, one that you can rebuild after the second year for $75.00—with a landing speed of less than 37 miles an hour—guaranteed top speed of 120 miles an hour and a fuel cost of less than 1½ cents a mile—an initial cost far below anything on the market, and regardless of some of the queerest yarns, some of the Jenny experts who have never flown such an airplane tell, it is so easy to fly that it's almost a shame to take money for showing a prospect how to operate it.

The unprecedented popularity of the new design necessitates your order being placed at least three weeks in advance.

Monocoupe "90" Performance

High speed	120 M.P.H.
Landing speed	37 M.P.H.
Cruising speed	105 M.P.H.
Climb	1100 ft. per min.
Horse power	90
Length overall	20 ft. 5 in.
Span	32 ft. 0 in.
Cruising range	525 miles

$75.00 Buys

Parts for complete overhaul of Lambert R-266 Engine

- 5 Cylinder barrels
- 5 Pistons with rings fitted
- 10 Valve guides
- 10 Rocker arm bushings
- 10 Spark plugs
- Complete set of gaskets

MONO AIRCRAFT CORPORATION

MOLINE, ILLINOIS

THE WORLD HAS WRITTEN THESE RECORDS OF CIRRUS RELIABILITY

1927 — Non-stop flight by Bert Hinckler — London to Riga (Latvia) — 1,200 miles in 10¾ hours — Cirrus powered plane.

1927 — Solo flight by Lieut. R. R. Bentley — London to Capetown, S.A.—8,000 miles — Cirrus powered plane.

1928 — Solo flight by Bert Hinckler — England to Australia—12,000 miles in 15½ days—Cirrus powered plane.

1928 — Solo flight by Lady Heath—Capetown to London —8,000 miles—Cirrus powered plane.

1928—Longest flight by light plane by Capt. W. N. Lancaster and Mrs. Keith Miller —England — Australia and Tasmania — 17,400 miles — Cirrus powered plane.



1928 — Cirrus powered planes won first in reliability, speed, economy, climb, aerobatics, controlability and maneuverability — Gothenburg International Flying Meet.

1928 — Solo tour of 8,000 miles by Miss Amelia Earhart — New York to Los Angeles and return—Cirrus powered plane.

1928—Light plane altitude established by Lady Heath who reached a height of 18,000 feet—Cirrus powered plane.

1929—Finish of Lady Bailey's 18,000 mile tour of Africa—most wonderful solo flight ever accomplished by a woman over uncharted routes. Cirrus powered plane.

1929 — Non-stop flight by Tex Rankin — Vancouver to Agua Caliente — Cirrus powered plane.

CIRRUS engines are flown in more countries than any other light aircraft engine. They have made light planes possible and private flying safe and practical. The outstanding records set forth on this page have established a confidence in Cirrus performance that promises fine competitive flying talent and universal interest in the forthcoming American Cirrus Flying Derby.

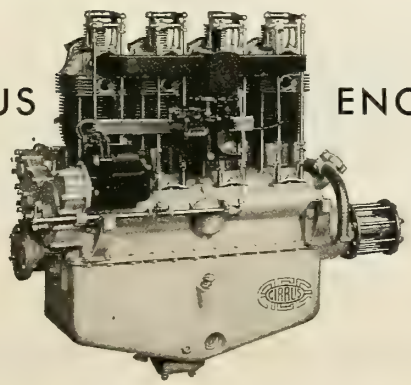
$25,000 ALL AMERICA FLYING DERBY

Sponsored by American Cirrus Engines, Inc., sanctioned by National Aeronautic Association. The world's greatest race over the air lanes of three nations. First prize $15,000; Second prize $7,000; Third prize $3,000. Open to all pilots flying ships equipped with American Cirrus Engines or American Ensign Hi-Drive Engines.

Write for entry blanks and full information.

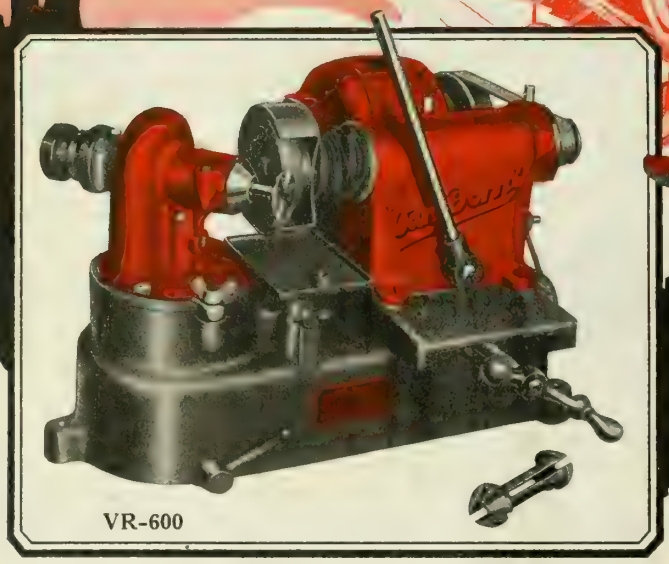
AMERICAN CIRRUS ENGINES, INC., MARYSVILLE, MICHIGAN

CIRRUS ENGINES

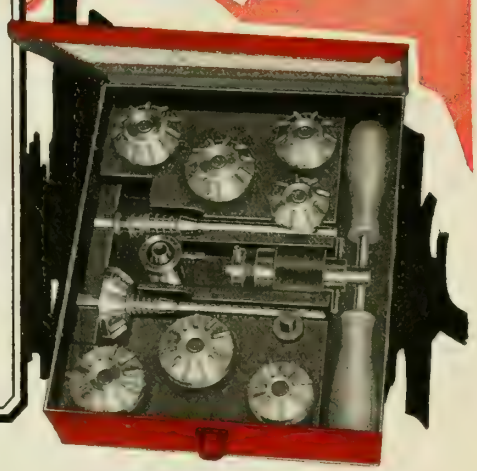


PREVENT VALVE TROUBLE IN THE AIR

Valve failure is frequently the result of misalignment between the seat and guide. Valve reconditioning with the Van Dorn Self-Centering Aircraft Pilots and the Van Dorn Aircraft Valve Refacer produces a precision job, insuring better and safer engine performance.



VR-600



VAN DORN AIRCRAFT VALVE REFACER

Capacity 1/4" to 11/16" valve stem diameters.

A precision grinding machine for refacing valves true to their stems. In addition it will accurately sharpen valve seat cutters, grind rocker arms, etc.

Valves are chucked accurately with twin grip collets which are suitable for aircraft valves with short stems.

VR-600 . . . . . $157.00

VAN DORN AIRCRAFT VALVE RESEATING SETS

Contain all the necessary equipment for recutting Airplane Engine Valve Seats rapidly and accurately.

UNIVERSAL AIRCRAFT VALVE RESEATING SET
Will service practically all makes of engines.
No. 55 . . . . . $98.00

CURTIS OX-5 VALVE RESEATING SET
No. 56 . . . . . $40.00

WRIGHT VALVE RESEATING SET
for Wright J-5, J-6 and R-1750 Engines
No. 57 . . . . . $68.00

DO THE JOB RIGHT ON THE GROUND

The Van Dorn Electric Tool Company - Cleveland, Ohio

Say you saw it in AERO DIGEST



Just as light as they can be—just as strong as they should be. That's the combination which has made Kelsey-Hayes aircraft landing wheels the standard equipment of the industry.

Kelsey-Hayes Service is World-Wide

AIRCRAFT DIVISION

Kelsey-Hayes Wheel Corporation, Detroit, Michigan

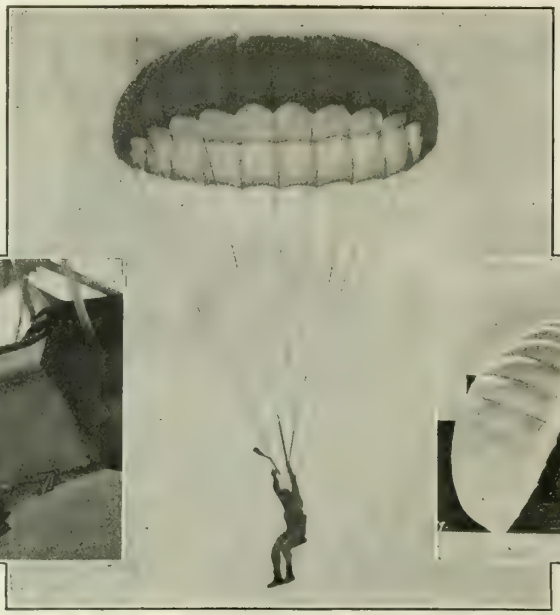
Affiliated Divisions:
Kelsey Wheel Company, Ltd., Windsor, Ont.; Wire Wheel Corp. of America, Buffalo, N. Y.; Kelsey Wheel Co. Inc., Memphis, Tenn.

KELSEY-HAYES

AIRCRAFT LANDING WHEELS

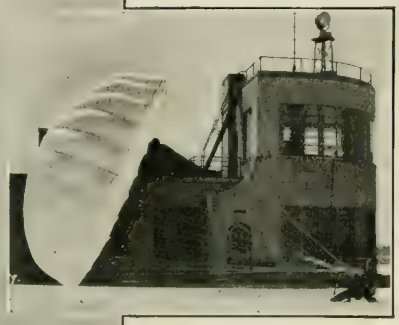
Say you saw it in AERO DIGEST

Floyd Smith, pilot, for nearly 20 years, wearing his compact Safety Chute, stepping into plane. Note the trimness of this pack.



(Left) Floyd Smith Safety Chute in action, approaching the ground. (Below) Chute opened, in front of Administration Building, Buffalo Airport.





Floyd Smith Safety Chutes

Pertinent facts you should read, behind the evolution of these advanced aerial life-savers, by Floyd Smith, first one to produce a free-type, manually-operated parachute.

IN 1912 I built a tractor biplane, flew it successfully at many exhibitions — until I met a cyclone at Hoisington, Kansas.

From that encounter I was fortunate to get out with my life —for I crashed from 1,000 feet. Since then, for 18 years, I have flown thousands of miles, piloted scores of kinds of aircraft — and studied constantly how to save the lives of those aloft should it be evident the ship for any reason, would do as mine did in that Kansas corn field.

In this, my interest naturally revolved around parachutes.

Early in 1914 both my wife and I had jumped from a plane—using a type of parachute attached to the plane itself.

But I saw that this arrangement was not practicable. Then, in mid-summer that year while I was looping, a wing collapsed —and at that moment there came to me, clear cut, the vision of the present free-type, manually-operated parachute pack.

It all looks simple now.

But there were years of baffling problems. Even when General Mitchell's cable came from the front in France, to the U. S. War Department to place me on parachute duty, to work out my ideas, it was just another beginning in an unprecedented field.



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President

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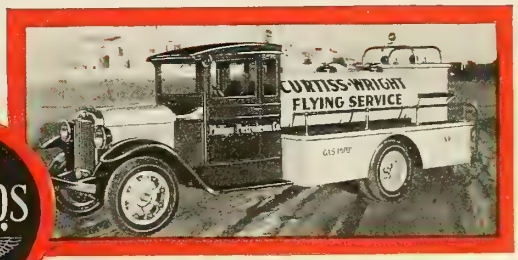
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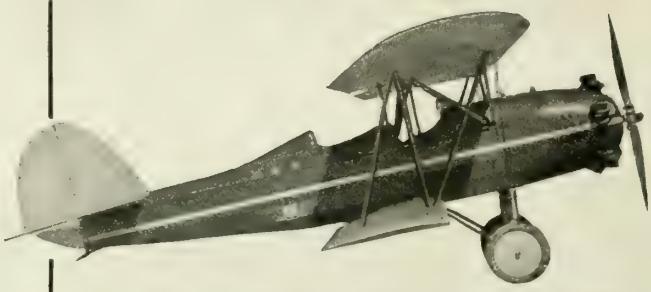
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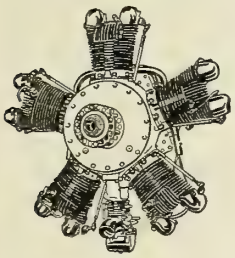
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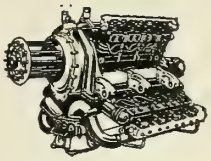
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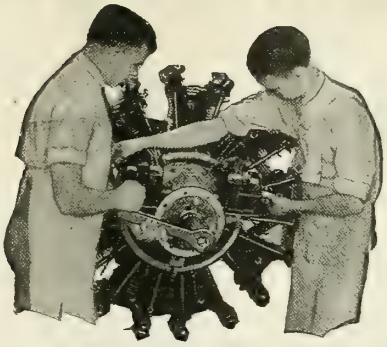
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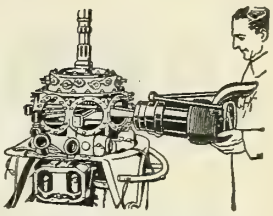
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THE MAGAZINE OF THE AIR

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Cover Design—Emsco-Cirrus sport plane in flight. Grand Central Air Terminal, Glendale, Cal.



FORMATION OF PURSUIT SHIPS REACHES RECORD ALTITUDE

A formation flight of Wasp-powered Boeing pursuit ships photographed on April 12th by Captain A. W. Stevens at an altitude of 20,000 feet where the temperature was forty degrees below zero. This view shows the 95th Pursuit Squadron of eighteen planes, led by Captain H. M. Elmendorf, during the Army Air Corps maneuvers at Mather Field.

THE AIR WAR IN THE WEST

Francis D. Walton

"PROGRESS" seems to be the proper word to sum up any review of the present condition of the Army Air Corps as exemplified in the 1930 Field Exercises which were held in California during the month of April. Other superlatives come as easily to mind in casting back over the remarkable mass formation work of the gigantic provisional wing which moved through the elaborate maneuvers with clock-like precision. It was a stupendous performance. It was remarkable, alone, as an achievement in organization. Both the friendly and hostile critics of air who will be content with nothing less than absolute perfection to the contrary notwithstanding, it would be safe to say that this year's coöperative work period of the Army fliers represents the greatest success of its kind ever seen. But when all of this has been said, it is better to return to the word "progress", for the exercises in California demonstarted most completely that condition when compared to previous annual maneuvers and particularly those held in Ohio last year.

Finally the exercises, which were held over a 20,000-square-mile area, stand for that progress which has marked the successful administration of the corps by Major General James E. Fechet and are most satisfying as indicating movement toward the objective which he set for himself upon his entrance into that high office.

The two outsanding features of the games this year were the perfection of coördination of the various elements within the provisional wing, which was under command of Brigadier General Gillmore, and the correlated mechanization work.

It was highly encouraging to see how the Air Corps engineers have adopted the latest and ever-astounding mechanical achievements of the scientists and, in putting them to practical uses, have removed from them much of their "freak" characteristics.

This is particularly true of the Sperry mechanical pilot which was afforded an opportunity of "going to war" for the first time in this spring's maneuvers. Its performance in guiding a bomber on an actual detail flight from Sacramento to San Francisco in the second week of the "war" gave the skeptics something to think about.

Less spectacular perhaps, but no less effective and probably far more important, was the radio telephone communication which was developed by the Army fliers and which was given its first practical work-out. The Air Corps demonstrated that it has achieved not only satisfactory ground-to-plane communication, but also highly effective plane-to-plane communication, and in this field it would appear to hold something that harassed airline operators wrestling with this same problem might well look into.

There was still another engineering development, this time in the division of radio photography, which made its initial appearance in the war games. This device, developed by the engineers of the Westinghouse Electric Company, permitted map makers to sketch fortifications, enemy supply dumps and other scenes important to warfare and to have their maps copied electrically and reproduced at the home base at Mather Field while the observation ship was still in flight. This experiment was carried out successfully first in a division of the field exercises on April 22 and also on the following day in one of the numerous air raids on San Francisco.

There were eleven distinct divisions in the chronological progress of the air problems, and it was largely through the intensified effort expended in the period of individual group training that the high degree of coördination missing in previous games was achieved.

First Stage—Airdrome discipline and familiarization with surrounding country, calling for operation of small elements.

Second Stage—Group training, including ground inspection and aerial review.

Third Stage—Tactical employment of separate groups, functioning under sealed orders.

Fourth Stage—Simulated attack on Crissey Field for the purposes of rendezvous experience and timing accuracy.

Fifth Stage—Pursuit attacks against bombardment and attack planes and defensive tactics of the latter.

Sixth Stage—Interceptive and communication problems under sealed orders.

Seventh Stage—Engagement of pursuit against pursuit planes protecting bombardment and attack planes on their respective missions.

Eighth Stage—air force attack on railroad bridges crossing the Merced River, north of Merced.

Ninth Stage—Bombardments and attack planes staging raid on railroad junction at Modesto, Turlock and Crows Landing.

Tenth Stage—Dawn attack by air force on enemy bombardment and pursuit airdromes.

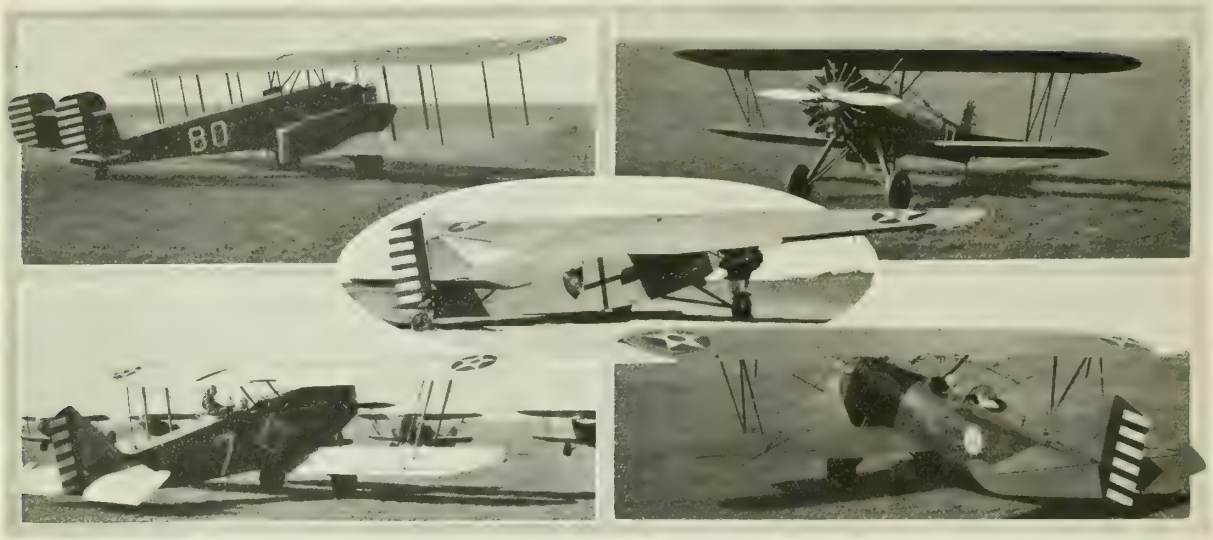
Eleventh and Final Stage— Simulated attack on shipping at entrance to San Francisco Bay to illustrate method employed by air force in operating against hostile fleet.

Reviewing the performance in these various stages, as regards the first to the third stage inclusive, as already commented upon, the thoroughness of the training period, arduous and far from spectacular work done here accounted for much of the subsequent success of the "post graduate" training period.

It was in the Seventh Stage that observers noticed the greatest improvement in the Air Corps' general efficiency. Here was the best exemplification of progress. This was particularly true of the pursuit elements, which showed a vast improvement over their work of a year ago in the Ohio "war." This stage was reached with the opening of the final week of the war games. The conditions of the tactical problem at this time found the provisional wing, operating as a unit of the "Blue Army", defending northern Cali-



Curtiss Falcon attack planes lined up for ground inspection at Mather Field during the Air Corps exercises



Representative types of Army airplanes participating in Air Corps maneuvers in California: (Upper left) Curtiss Condor bomber; (upper right) Boeing pursuit; (lower left) Douglas observation; (lower right) Curtiss attack; (center) Ford trimotor ambulance plane

fornia from the attacking "Red Army" which was then pushing its way up from the south where it was conceded to have captured Los Angeles and devastated the southern part of the State.

Leaving Mather Field, the bombers proceeded to the Merced River, there to destroy all bridges which the invading army might find useful. The attack squadrons preceded the bombers, detailed to clean out vanguard forces and light mobile units of the invading host. The Blue Army pursuit ships accompanied the heavier air forces for protective purposes, and although the conditions of the problem called for a surprise attack by a larger air force sent up from Marysville, the significant feature was the manner in which the three-element division flying south coöperated. The timing was excellent in almost all cases. Coördination was perfect, and it was clearly shown that the pursuit men had profited enormously from the lessons which were learned in highly disastrous experience in the Ohio "war" of 1929.

It is difficult to single out any particular units or elements in the conferring of special tribute. Some of the elements assigned less spectacular details did work which accounted for a large measure of the success enjoyed by the more spectacularly performing groups. The 95th Pursuit Squadron was given an opportunity in the second week of the "war" to show what it had learned about high altitude maneuvering. Its work in formation at 25,000 feet and higher was, indeed, one of the high lights of the games.

There were three general reviews of the provisional wing in the course of the field exercise period. The first was held at Mills Field, San Francisco, which turned out to be a splendid field day for the war fliers. Although it may seem incidental to the general purposes of the West Coast massing of the Air Corps forces, it is nevertheless significant that this review and the third, held after the close of the games on the occasion of the dedication of the United Airport at Burbank, Calif., did more to "sell" the program of air defence to the people of the West Coast than has any other single move by the War Department. This second review was staged at Mather Field upon the arrival there of General Fecht.

Another phase of the maneuvers which, because of its utility in any future warfare, cannot properly be overlooked, was the transportation of military supplies by air over relatively long distances. In commenting on the Air Corps demonstration, F. Trubee Davison, Assistant Secretary of War for Aeronautics, had this to say concerning the importance of transport work:

"Of importance are the lessons the Field Exercises taught us in the transportation of supplies. I think it most impressive that about 75,000 pounds of miscellaneous supplies ranging from airplane wings and heavy engines to cotter pins and typewriter ribbons were carried by Army Air Corps transports over the 500-mile route from the supply depot at San Diego to Sacramento."

It is not difficult to cite lessons learned and to indicate values received from these annual gatherings of the Air Corps forces. Easily drawn, they may be easily discounted. Nevertheless, it should be remembered that the West Coast "war" was an all-air "war," in the fullest sense of the word, and for the first time aviation was given an opportunity to hold its own individual military exercises. The sense of a task well done and the feeling of significant achievement which the men of all of the military air elements of the Army took home with them when camp was finally broken at Mather Field built up morale and self-confidence that justifies all of the expense and all of the effort expended on these Western games.



Bombardment airplanes passing in review at Mather Field

THE NEW GEOGRAPHY

Don Rose

AMONG the sad accidents of life, there are few so serious as the one which overtakes the average man's education when it begins to get tangled up with realities. Its owner spends a dozen years or more putting the poor thing together, but the stormy weather of real experience can nearly ruin it in as many months. The glue comes unstuck and the cotter pins fall out, and soon there is little left but a scrapheap of scrambled information. If it wasn't for the fact that a little sense and good judgment are sometimes discovered among the wreckage, the whole business of education might look very much like a serious waste of time.

Of the high school subjects, geography is possibly the most liable to change and decay, not to mention confusion and destruction. It is an invariable and invaluable part of the high school course, but it doesn't seem to keep well in this climate. Either the facts we learn about geography in school are thrown completely out of whack by the time we might make some use of them, or else they get totally mixed up inside us and become about as serviceable as a wagon-load of spare Ford motor car parts to an aeronautical engineer.

When I went to school, for instance, I learned a lot of geography. I learned the whereabouts of Cairo, Calcutta and Korea, and the population of Peking. I could tell you the exports of Ecuador and the industries of Indo-China. I knew twenty-seven nations by their first names and could make the capital cities of all the States in the Union stand in line and answer roll call.

But today my geographical information is boiled down to very little, most of which isn't so. I know where New York is, because I have been there, and I am fairly certain about Camden, New Jersey. I have a general idea that France and Belgium and Spain are somewhere on the other side of the garage, and that Pittsburgh is where the sun goes down, though nobody knows why.

Practically every other place which gets into the news is somewhere in the neighborhood of Siam. Sarawak, Singapore, Tacna-Arica and Timbuctoo are all near Siam. Kamchatka is in Siam and so are Tegucigalpa and Johannesburg. I wouldn't be surprised if Grand Rapids were in Siam, too, though I am not sure of it. But Czechoslovakia is certainly in Siam and so is Mesopotamia. All of which goes to show how interesting geography is, and what an important place it has in a well-rounded education.

Since I am such an expert in geography, I have chosen it this month for one of my illuminating and instructive discourses. And the specific subject of my sermon will be none other than the city of Philadelphia, City of Homes, Workshop of the World, Birthplace of the Nation, City of Brotherly Love and Home of the Liberty Bell; famous also in song and story as the place where Al Capone spent nine months in jail for carrying personal artillery or for other reasons best known to himself.

If you will turn to page 40 of your geography books, you will notice that Philadelphia is a seaport city of some magnitude, bounded on the west and south by the Delaware River and on all other sides by Japanese beetles. It has a population of more than two millions, including Democrats, and does a nice little business in textiles, shoes, carpets, felt hats, locomotives, and more-or-less denatured alcohol. It is next-door neighbor to New York, though it doesn't brag about it, and it has salt water on one side of it and fertile plains and hills of Pennsylvania on the other.

Those who know Philadelphia well and still insist on living there consider it a remarkable city. Probably the most remarkable thing about it is that until lately it has had no airport larger than a fair-sized cemetery. Since there are three or four aeronautical factories in the neighborhood, a naval base and a naval aircraft factory, and a number of air-minded citizens, this must be considered really remarkable.

It is possibly even more remarkable that Philadelphia is at last to have an airport, which may someday turn out to be the finest airport in the United States. If it is ever built and finished according to plans and specifications, it will be more than an airport; it will be a transportation terminal scaled and designed to the needs of the future and located where it will change the tides of traffic and travel and upset all the geography of the last generation. It may be interesting to the customers to review the circumstances under which Philadelphia staked out such a promising and profitable claim on the future, and the story may inspire other cities to go and do likewise, according to their opportunities.

You older fellows may remember that there was once a war, way back before prohibition, and that this nation got nicely mixed up in it. It got so thoroughly mixed in it, in fact, that it eventually spoiled the war, and it did so by supplying money, men and food to the Allies on the other side of the Atlantic at a time when such useful commodities were getting scarcer every minute. In order to keep these things moving overseas the nation needed ships, and instead of ordering them from Sears, Roebuck and Company, the Government decided to build them.

Among other places, it decided to build them at Hog Island, a mud flat located at the far end of Philadelphia's back yard. Nobody seems to know why it was called Hog Island; any hog that lived there for long would need to grow fins and web feet. It may have been an island, since an island is a piece of land surrounded entirely by water, and this one had water on all sides and on top of it as well. But this didn't discourage the Government. Inside of a year the nation spent $53,000,000 on Hog Island and made a shipyard of it. It made ships there, too, and was just getting good at it when the hazards of war gave place to the horrors of peace, and the Shipping Board discovered it was "all dressed up and no place to go."

So Hog Island subsided again, gently but firmly, back into the primeval mud. Most of the buildings were torn down and the rest fell down. Most of the sand, soil and ballast which had been put there to bring the place above sea level stayed there, however, but Hog Island was still no place to spend a wet Sunday. A number of bright suggestions were made for turning it into one thing or another, including industrial sites, amusement parks, tennis courts, zoological gardens and what have you, but after a while these also disappeared into the mud and were seen and heard no more.

It was nearly two years ago that the air-minded citizens of Philadelphia, aided and abetted by the Philadelphia *Public Ledger* in particular and the newspapers in general, resolved to have a municipal airport that was worthy of the name. After this idea had been discussed for six months or so, sundry committees of experts, engineers and city fathers began to scour the city for suitable sites, looking carefully in the most unrea- (*Continued on next page*)

sonable places and having a lot of good clean fun with the real estate promoters. It was another six months later before somebody suggested that Hog Island was still in its accustomed location, and could be reached in a canoe or flatboat if the official inspection committee wasn't nervous. And after another while the big idea was born—to buy Hog Island from the Government, repair and renew it, and build on it an airport and three-way terminal for transportation by air, sea and land.

Did you ever try to buy anything from the Government, except a postage stamp? If not, take Philadelphia's word for it that it's not easy. The Government, as represented by the Shipping Board, was about as keen to sell Hog Island to Philadelphia as a small boy might be to surrender the safety pin which is holding up his pants. First it would sell and then it wouldn't and then again it would. The price wobbled up and down, and there was continual talk of contracts, guarantees, terms and provisions, until the innocent bystander began to think that the whole thing was framed, with niggers in the woodpile and everything. Every other Wednesday the Shipping Board would meet and postpone the proposition, and every other Thursday the city council would pass another flock of resolutions and ordinances, and approve a new plan for buying an airport and paying for it. At last some inspired councilman, who was probably brought up in a horse-trading territory, started a campaign to buy land for an airport somewhere else, at which moment the Shipping Board suddenly made up its mind and closed the deal. Philadelphia signed on the dotted line for $3,000,000 worth of Hog Island and began to look around for its pick and shovel.

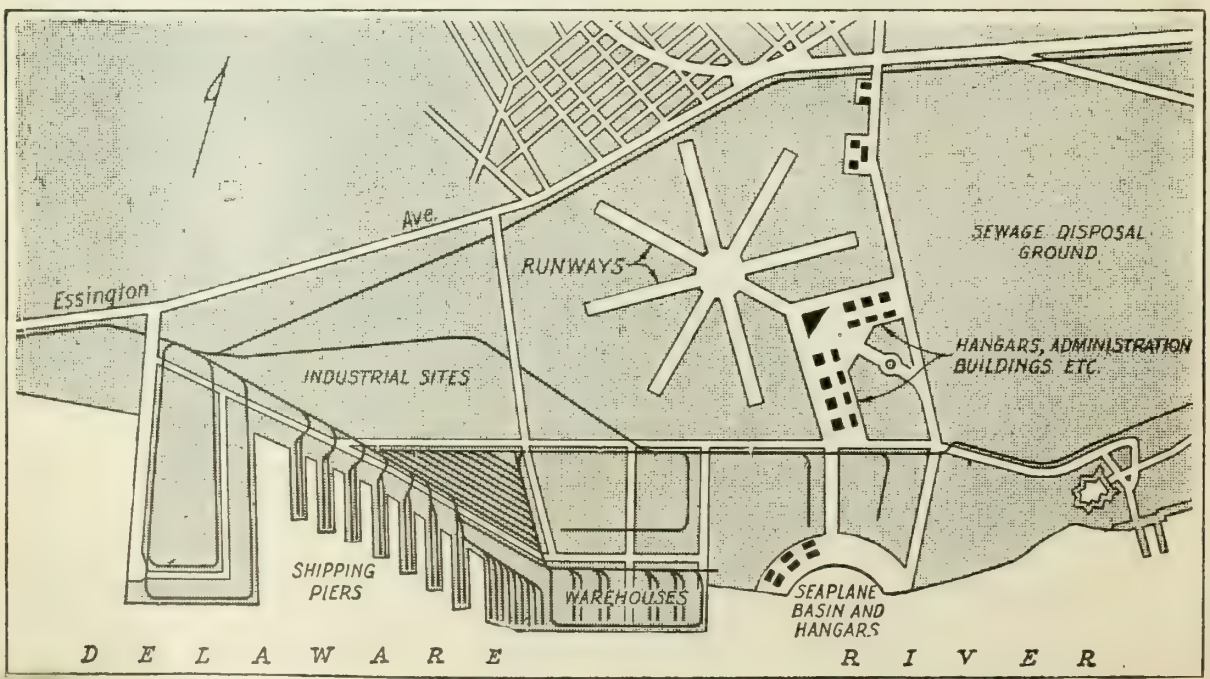
It took two years, but at the end of that time the nation's third city had its hands on a sweet proposition, and had undoubtedly bought the best bargain in real estate ever sold to a big city.

Now I'm perfectly aware that some of the brethren who have promoted and built the magnificent airport in Pensauken Township, New Jersey, which goes by the name of Central Airport, are disposed to think that Philadelphia needed Hog Island about as much as Bishop Cannon needs hip pockets. They argue that Central Airport is a short twenty minutes run from Philadelphia's City Hall over the new Delaware Bridge, that it is big enough for all the business in sight, and that two big airports within six or eight miles of each other make something of a crowd. They point to the fact that Hog Island can never be closer than half an hour to the middle of things, that it's nothing but a mud flat anyway, and that it is going to cost millions and millions and more millions to make it look anything like the pictures. All of which is very true.

But the purchase of Hog Island must be considered as part of a bigger plan, or else it is just another bad dream in municipal politics. The plan has its eyes on the future. It is looking to the time when Camden and Philadelphia will no more be able to get along with one airport than they can get along with one bus terminal. More important still, it is looking toward a composite terminal, where air traffic can make direct connections with all other communications. Most of us know, or can find out, that the average airport is located exactly where it is most difficult to reach it. The railroads are at the other end of town, the bus and trolley lines have regular engagements elsewhere, and the good roads get discouraged long before they reach the flying field. It isn't that way everywhere, but it's liable to be.

Hog Island's future depends on the fact that it is ready to hook up with every conveyance known to man except roller skates and snow shoes. It has three miles of waterfront, such as it is, on a river which carries 29,000,000 cargo tons a year to all the ports of the world. A railroad line skirts it now and others can reach it. It is directly in line with the new industrial highway which will run from Wilmington, Delaware, to Trenton, New Jersey, and thence to the Hudson River cities. It needs only a few miles of highway to connect it with Broad Street, said to be the world's longest straight city street, which goes squarely through the heart of Philadelphia and out to the Lincoln Highway. It is wide open to the blue sky, and

(*Continued on page* 246)



(*Courtesy of New York Times*)

Map of the Hog Island site in Philadelphia showing the proposed air transport, marine and rail facilities



Passengers leaving a bus at Ford Airport, Detroit, to board a Stout Air Lines Ford trimotor about to take off for Cleveland.

AIR TRANSPORTATION with SAFETY

A Brief History of a Million Miles of Flying on Stout Air Lines

By Bert Stoll

IN THREE AND A HALF YEARS' time, Stout Air Lines have expanded from an experimental passenger air line connecting Detroit and Grand Rapids, Mich., with one plane each way daily except Sunday, to airlines connecting Detroit with Cleveland and Chicago. And instead of one plane each way daily, four Ford trimotor monoplanes capable of carrying fourteen passengers each cruise the air lanes between Cleveland and Detroit and three each way between Detroit and Chicago.

Whereas in 1926, the initial equipment consisted of one single-engined Ford cabin plane powered with a Liberty motor, the Stout lines now operate eight Ford trimotor transport planes and a single-engined cabin Fairchild. The trimotor equipment is flown on the airlines between Cleveland, Detroit and Chicago; and the Fairchild plane is used for special aerial taxi work.

A Record of Safety

Since these airlines were first begun in August, 1926, its planes have carried more than 107,000 passengers (up to April 23, 1930) without an injury to a passenger, and have covered a distance of more than 1,000,000 miles.

But what lies back of this record of expansion and safety? A consideration of the history of the company reveals some of the factors that have made the expansion of Stout Air Lines possible.

William B. Stout, who now heads Stout Air Lines as president, first became involved in aviation as a manufacturer when, during the World War, he built a Bat Wing monoplane for the Bureau of Aircraft Production. This plane, which was powered with a 150-horsepower Hispano-Suiza engine, had no fuselage. Since the tail surfaces were attached to the trailing edge of the wing, they were blanketed by the wing, and the experiment was therefore discarded after the first flight.

Several other experimental planes followed. Mr. Stout's fourth plane was an all-metal monoplane equipped with two Packard 300-horsepower engines and was built for the United States Navy. This ship was designed and constructed in the Stout Engineering Laboratories, the work having started in February, 1920.

Recognizing the potentialities of the strictly commercial airplane, Mr. Stout then decided to get sufficient capital together to build such a machine. With the result that the Stout Metal Airplane Company was formed with 128 stockholders each of whom contributed from $1,000 to $5,000. No doubt, all of them fully understood that inasmuch as the proposition was experimental they might lose all their money in it. Soon thereafter, William B. Mayo, chief engineer of the Ford Motor Company, became interested in Mr. Stout's work. He, in turn, was instrumental in interesting Henry Ford and thereby brought the automobile manufacturer and the airplane designer together.

The first Stout metal airplane was built in the city of Detroit and successfully tested at Selfridge Field. But Mr. Stout wanted a factory on a flying field. Through cooperation with Mr. Ford, the present Ford Airport was developed on Ford properties at Dearborn, Mich.

Henry Ford and the Stout Metal Airplane

Mr. Ford then suggested that Mr. Stout work up plans for an airplane factory which he would build on the new Ford Airport. This was done, in spite of the fact that Mr. Ford at that time had no interest in the Stout Metal Airplane Company. About twelve Stout all-metal cabin monoplanes, each equipped with a Liberty motor, were built in this factory. One was sold to the Post Office Department. The Ford Motor Company took four or five for its own use in experimental air freight and express service. One was sold to the Wanamaker store in New York, and three went to the Florida Airways.

In July, 1925, Henry Ford offered to take over the airplane factory, provided that he could get all of the stock. Consequently, the original stockholders in Stout Metal Airplane Company sold out to him, receiving two to one on their investment.

It was then that Mr. Stout organized the Stout Air Services, Inc. The period from July, 1925, the date of sale to Mr. Ford, until fall was devoted to the organizing of the new company. In September, 1925, Stout Air Services were ready to consider an operating policy. The new company could follow three plans. Either it could operate airlines, or it could invest in other airlines, or it could both operate airlines and invest in other lines. The latter alternative was adopted. Investments were then made in Florida Airways, Western Air Express, Northwest Airways and Scenic Airways.

For its own airline operation, the new company decided to fly planes between Detroit and Grand Rapids. This line was inaugurated August 1, 1926. The Stout all-metal plane originally sold to the Wanamaker company in New York City was purchased and flown to Detroit in January, 1926. It was altered slightly and placed in daily service between Detroit and Grand Rapids in August of that year.

The Original Stout Passenger Air Route

The original route selected for passenger airline operation was from Cleveland through Detroit to St. Paul and Minneapolis; but because only one plane was available and also because of lack of operating experience, it was decided to begin operations on the Detroit-Grand Rapids line with the hope of extending it across Lake Michigan to Milwaukee and then on to the Twin Cities in the spring of 1927. Various schedules, plans of operation, traffic campaigns, etc., were tried on this line.

In December of 1926, a second plane was obtained—another all-metal Stout cabin plane powered with a Liberty motor. This ship was used as a reserve plane on the airline, thus allowing daily operation (except Sunday) and insuring maintenance of schedules.

After a year of operation, neither planes nor radio equipment had developed sufficiently to warrant the eighty-mile hop across Lake Michigan to Milwaukee. In order to conserve resources and also because the experimental data on the short airline to Grand Rapids indicated its advisability, the company decided to suspend this line on July 30, 1927, until the flight to Milwaukee was feasible from a safety standpoint and concentrate on the Detroit-Cleveland line which was started November 1, 1927.

The first trimotor plane was purchased July 1, 1927, from the Stout Metal Airplane Company, which had become a division of the Ford Motor Company. This larger plane was used on aerial tour work that summer, and on November 1, it made the inaugural run on the Detroit-Cleveland division.

Many lessons were learned from a year of operation on the Detroit-Grand Rapids airline. First the length of this line, 142 miles, was too short to afford a material time-saving for the traveling public. Nor was a single round trip per day deemed sufficient to be of practical value. Airplanes like motor trucks, must be in use as many hours as possible to show a profit in their operation. In addition, aerial tour work over various cities, as well as aerial taxi work for special chartered flights to other cities, was found profitable and economical through the reduction of the air line overhead. It was also learned that airlines will never be able to compete with railroads successfully until night flying with passengers is feasible.

Detroit-Cleveland Line Inaugurated

On November 1, 1927, the Detroit-Cleveland airline was begun by Stout Air Lines, with two departures each day, except Sunday, from both cities. In addition to this line, aerial tour work consisting of short sightseeing flights over various cities was continued at Detroit, Cleveland, Flint, Canton, Akron and Toledo. Now there are four Ford trimotor planes operating each way daily except Sunday on the Detroit-Cleveland division.

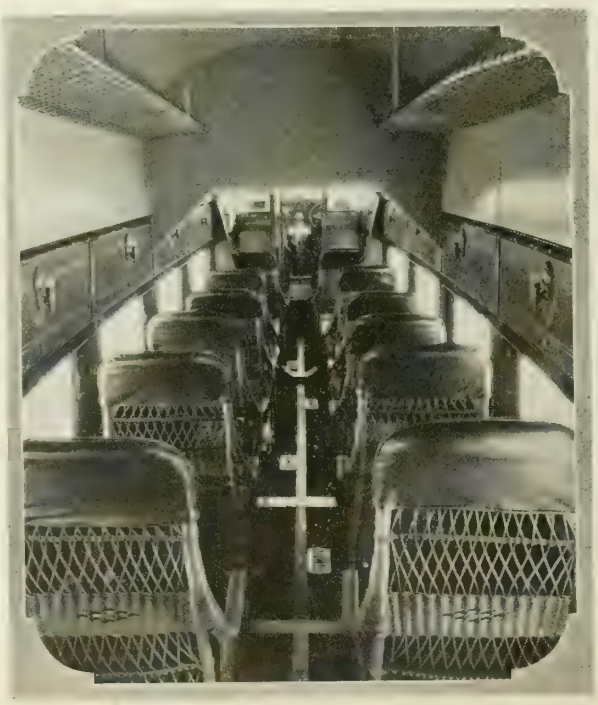
On November 1, 1928, the Detroit-Chicago airline was begun. This route takes the air traveler over 250 miles of countryside between Detroit and Chicago. The Detroit-Cleveland division covers a route of 128 miles around Lake Erie by way of Toledo. When the Detroit-Chicago line was first started, there was one round trip daily except Sunday. Now three of the Ford trimotor transports leave each terminal daily except Sunday.

Both on the Detroit-Cleveland and Detroit-Chicago divisions of Stout Air Lines, pilots receive weather reports on half hourly schedules by radio from the Department of Commerce weather station operated in conjunction with the Department of Agriculture along established airways.

In the case of the Detroit-Cleveland airline, in addition to the terminal fields, Ford Airport and Cleveland Municipal Airport, there are excellent landing fields at Monroe, Toledo, Camp Perry, Sandusky, Vermilion and Lorain. This route is also lighted with standard airway beacons.

On the Detroit-Chicago air line, there are landing fields at Ypsilanti, Ann Arbor, Jackson, Battle Creek, Kalamazoo and Niles, in Michigan; South Bend and La-Porte, Gary, in Indiana; and Lansing, in Illinois.

The officers of the Stout Air Lines are as follows: William B. Stout, president; William B. Mayo, vice president; Stanley • E. Knauss, vice president, treasurer and general manager; and Donald J. Rogers, secretary.



Passenger cabin in a Ford operated by Stout Air Lines

TWO-WAY RADIO COMMUNICATION IN AIR TRANSPORT SERVICE—Part II

By

Herbert Hooner Jr.

Radio Technician, Western Air Express

IN the first part of this article, which appeared last month, some of the engineering and technical problems which are involved in two-way communication with aircraft, were set forth. This month the discussion is devoted to the principles of operation, pointing out in a general way the manner in which this rapid means of communication can be utilized to the best advantage.

Prior to 1929 the scheduled airlines of the United States had not been able to avail themselves of reliable communication with aircraft while they were in flight. Systems for communication other than radio, such as visual signals, had been employed, but their usefulness was very restricted. A few transport operators used colored panels or some similar means of giving information to planes passing over their airports; but only the most elementary messages could be sent in this manner, and anything approaching an actual conversation was impossible. If a pilot wished further information from the ground or had messages that he wanted to give during flight, his only recourse was either to land or drop a note. Either of these alternatives was unsatisfactory from an operating point of view, with the result that virtually no communication was attempted while the planes were in flight, even though it might have been highly desirable.

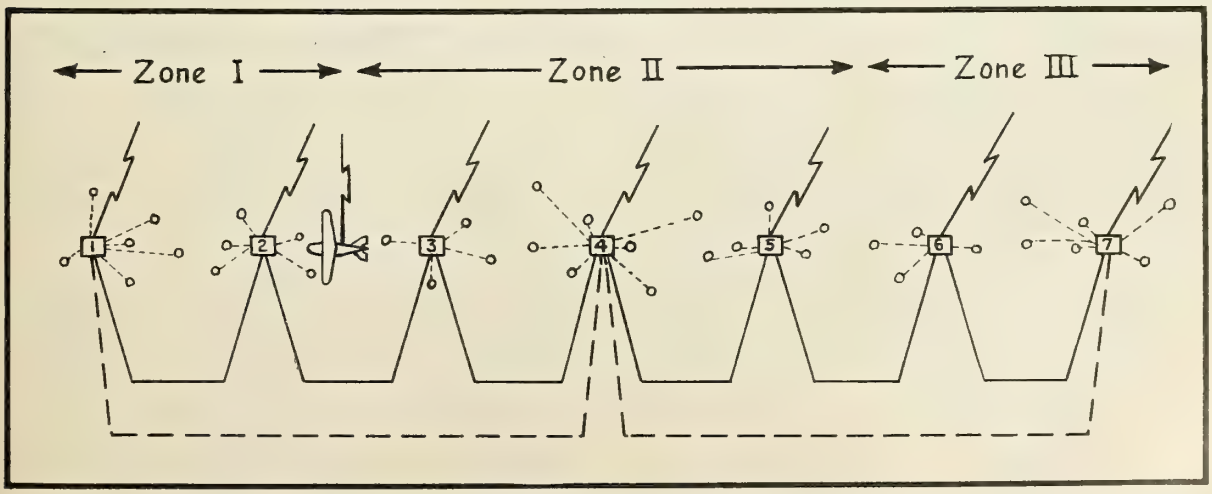
In view of these limitations, the general method of operating airplanes along the major airways of the country was from the beginning, considerably hampered. Almost invariably the routine was somewhat as follows:

Before a plane took off for the next airport, there was a period of feverish activity in which information regarding weather, wind velocities, positions of other planes, passenger lists at points along the route, and many additional operating details, were collected and given to the pilot as they existed at the moment of his departure. As soon as the ship had left the airport, the ground personnel lapsed into a period of inactivity and waited expectantly for a report that the destination had been reached. Weather conditions might have changed completely during the time that the plane was in the air, and yet, because the pilot could not be warned of this fact, the ground organization was powerless to help him. For this reason there was no incentive for the collection of additional weather information between the time that a ship had left one airport and arrived at the next.

On the other hand, the pilot himself might have experienced favorable or unfavorable conditions which would have been of vital interest to another pilot who was either behind or in front of him. And yet, because he could not pass this information on, its value was definitely lost. Furthermore, because of some unforeseen change in the weather, the pilot might not have been able to land at the field of his original destination, and therefore would be forced either to land at some intermediate field, or grope around for some other suitable location near his objective. In case he landed at an isolated emergency field, his whereabouts would be of great concern to all of his operating organization. On the other hand, if he found it necessary to look for an alternate landing place near his point of destination, particularly in the event of bad weather, he unwillingly assumed an added burden of responsibility for the safety of his plane and passengers.

With the availability of two-way communication, however, an entirely new system of airplane operating procedure has become possible. Instead of the old method by which the pilot was isolated from the moment he left the ground, he now is in direct telephone communication with the major airports along the route and with other airplanes in his vicinity. In place of the intermittent collection of data before the departure of a plane, there now is a smooth working system, based primarily on the fact that the pilot is constantly in touch with his ground organization at all times.

As he moves along the airway, he is periodically advised as to changes in weather (*Continued on page 260*)



Schematic diagram of an airway showing communication networks between aircraft, airports, and weather observers. Airports 1, 4 and 7 are control stations for zones I, II, and III respectively. Average distance between radio equipped airports is 250 miles

TECHNICAL NOTES AND CRITICISM AT THE DETROIT AIR SHOW

By D. W. Huntington

MOST of the planes exhibited at the Detroit air show were good in general design but some of the amateurish details reminded one of the remark of a prominent American ace to the effect that every airplane was worth looking at, even though it merely showed how not to do it. Several planes were weighted down with superfluous struts and wires, one job including ten struts in its two nacelle supports that were unnecessary structurally and detracted from the appearance, as well as the efficiency, of the otherwise clean design. On many, slabs of excess metal served the purpose of fittings. Here and there control cables were exposed in a crude manner.

Scrutinizing interiors, one is impressed with the efforts being made to increase both comfort and beauty in this respect. However, Army type throttles, safety belt harness strewn over seats and floors and antiquated control systems with their sticks or columns obstructing the cockpits and cabins in an unnecessary manner, are worthy of further study on the part of many manufacturers. Few cabin ships show proper respect for front seat passengers, instrument boards being exposed in an ugly way, with gadgets protruding from them and with sharp corners and cross wires above them, all ready to coöperate in injuring pilot and passenger when thrown against them, in cases that would otherwise be of little consequence, the ship running into very soft ground for example. The proper method of eliminating this danger seems to lie in extending the cowl deck back slightly over the instrument panel and finishing the edge with a well upholstered crash roll.

There was a perceptible feeling of optimism prevalent among some of the manufacturers, and when this was run down, it was found that a few of them were actually beginning to consider the buying public in their plans for expansion, or continuation, as the case happened to be. In short, the aircraft industry seems poised for a retreat, getting ready to back up for a flying second start as it were. Probably it has waited all these years before doing so out of respect for the few early manufacturers who persisted in hanging on, waiting for them to wink out. When they finally obliged, it made ready to pack its tent and return to 1900.

So gliders were in evidence at the show. The primary type included the Alexander at $375, Waco $385, Cessna $398, and Detroit $485. All are of the conventional monoplane type braced with piano wire. Two soaring gliders were shown, the Bowlus sailplane, which is made in Los Angeles, and which holds the American duration record, and the Wolverine, made in Detroit. These are cantilever monoplanes of large aspect ratios. The presence of these gliders was in answer to a demand, one believes, rather than a cunning play on the part of some plane manufacturers to save their scrap spruce from the hands of step-ladder and porch furniture manufacturers. The largest group of air-minded people consists of young men from about fifteen to twenty-five years of age, of limited means, and this effort to provide them with a homely something they can afford is commendable and is certain to pay those who follow the trend closely.

The next stage of development reverts to 1905 and the years immediately following. Then two men sat abreast on the frontporch of a box kite with the engine alongside where they could keep an eye on it, and hopped around the country on 35 horsepower, blissfully unaware of the possibility that twenty-five years later universities would graduate slipstick addicts who would prove conclusively that it couldn't be done on less than 70 horsepower. But several manufacturers know that the buying public wants planes of higher safety and lower costs, ships which people can afford to buy in large numbers and which can be mastered in a few hours' instruction. This demand will presently be answered by numerous types of powered gliders or motorwings, or whatever name the model assumes. And under the popular influence of these rigs, intelligent plane manufacturers will go in for lower powered and more economical engines in ships having much lower wing loadings. Probably the nearest approach to this type of plane is the Aeronca, designed by Jean Roché. Powered with an engine of 30 horsepower, this wire-braced parasol monoplane performs well. Room for a second passenger is provided on an abbreviated seat behind the pilot. The price is $1,495.

To the Simplex company goes the prize, if any, for the most radical job on display. This consisted of a two-passenger, side seating, open, land type, tapered wing cantilever monoplane, powered with the 30-horsepower Szekley. It carried the name of Kite and was priced at $1,995.

Two engines worthy of mention in connection with low powered planes are the two stroke-cycle Cleone, made in St. Louis, and the four stroke-cycle Lambert H-106, made in Moline, Ill. Both are of the two-cylinder horizontally opposed type, air-cooled. The former has single ignition of the motorcycle engine type, develops 25 horsepower at 2,700 revolutions per minute, weighs 52 pounds with its propeller, and is priced at $385. The Lambert has a bore of 4.25 inches and a stroke of 3.75 inches.

The Shell Petroleum Corporation's Travel Air S was the only high performance single-seater on display.

In the field of two-passenger, tandem-seating, open land planes were the Great Lakes, which, with its price of $3,150, is certain to have a strong appeal, the Driggs Skylark, Warrior, Consolidated Fleet, Whittlesey Avian, Parks and Fairchild biplanes. The monoplanes of this model were the Davis parasol, Mohawk Pinto and Watkins Skylark, the two latter being the low-wing types. Considering the fact that there are some three dozen ships of this model being offered by the trade, the show representation was very limited. An experimental biplane was shown by Crosley, with a 100-horsepower inverted in-line four-cylinder engine of the same manufacture.

In the class of high performance two-seaters, the Laird biplane carried off the honors in performance, compactness and workmanship. It was truly a beautiful job. The Stearman biplane was imposing; plenty of airplane for only two people. The Lockheed Sirius, low-wing all-wood cantilever monoplane, like the one flown by Col. Lindbergh, drew a crowd at all times. The catalogue performance of this plane shows a landing speed of 45 miles per hour (in spite of a surface loading of over 19 pounds), and a high speed of 180 miles per hour— a speed range which is unusual, even in a catalogue.

(*Continued on page* 256)

INTERPRETING the WEATHER MAP

Martin L. Dobler

Member, American Meteorological Society

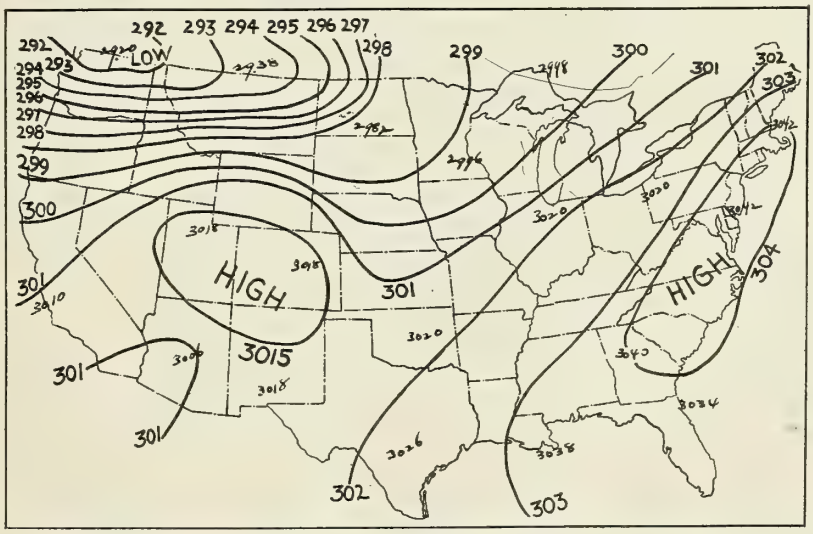
THE importance of the weather map to airplane pilots of today cannot be overemphasized, for with its aid he is presented a picture, so to speak, of what is going on in the atmosphere throughout the length and breadth of the United States and Canada.

In this article, therefore, we shall try to analyze some of the chief characteristics of these daily maps of the U. S. Weather Bureau in a simple manner, so that the pilot may decide which pressure distribution will be most favorable for his cross-country flight or which circumstances will advise him to postpone his voyage.

Let us then approach a study of these maps with an explanation of the term "low" and "high," or low pressure and high pressure areas, and the barometer lines, or "isobars," meaning lines on which all points have approximately the same pressure readings.

High barometer (high pressure) means heavy cold air coming down from aloft with attendant clear skies, whereas low barometer (low pressure) indicates lighter, rising air and cloudy skies usually attended by rains or snows.

The course usually taken by these areas of high and low barometer on the North American continent is from west to east. Pilots generally encounter the prevailing westerly winds at 5,000 feet and above. There is, however, a single exception to the general circulation over northern latitudes and that is during the fall season of the year the West Indian Hurricanes travel in a west-to-east direction, from the time of their inception over the island of Barbados, in the British West Indies, to the point of their recurve, usually about latitude 25° or 30°, whence they again assume the west-to-east course over the North Atlantic Ocean.



Hypothetical weather map showing the distribution of high and low pressure areas

The wind circulation around an area of low barometer is anti-spirally inward, and the air is forced upward, whereas the winds in an area of high barometer blow spirally outward, or clockwise, and the air descends from aloft.

The closer the isobars are, the steeper the gradient, the stronger the winds are, both at surface and aloft, usually considerably stronger at the upper levels. On the accompanying weather map, up in the far Northwest we note a very decided storm area off the North Pacific Coast, with lowest barometer at center about 29.20 inches. Usual normal sea-level reading is 30.00 inches, which as a rule indicates fair weather.

Since the lines are very much crowded in the Northwest, south and southwest gales aloft would be encountered over Wyoming, North Dakota, Montana and Washington, while farther south over Colorado and Utah, winds both at surface and aloft would be only light to fresh in velocity, because that is near the center of an area of moderately high pressure.

Along the Atlantic Coast, we see settling off the middle and south Atlantic States a strong area of high barometer, the aftermath of a severe cold wave which had enveloped the entire East. The isobars from the Lake Region eastward to the New England coast, and from the Middle West southward to the Gulf of Mexico, indicate that in these territories the pilot would experience winds of but moderate velocity at surface and aloft, and mostly from a southwest and westerly direction.

This pressure arrangement of the map would, therefore, augur well for flying activities over almost the entire United States south of latitude 40°, but out over the northern Rocky Mountain region and the North Pacific Coast States, stormy weather, with low ceilings and gales, would be encountered.

Pilots ought nearly always to take advantage of high pressure areas as against low areas. The former usually are accompanied by fair skies, unlimited ceiling and splendid visibility; the latter, by poor visibility and very low ceiling clouds.

An example of pilots taking advantage of the influence exerted by high pressure areas was brought very forcibly to my mind one day, the middle of March, 1930, when with an area of high barometer settling off the Middle and more especially the South Atlantic Coast, we enjoyed a most delightful air journey over the famed Chesapeake Bay region of Maryland. Skies were clear, and our winds at surface and aloft, up to 8,300 feet, light in velocity, eight to ten miles per hour. Visibility over the eastern shore of Chesapeake Bay was about seventy miles northeast and south, while over on the western shore, a slight smoke haze was noted, especially when we came under the smoke influence from the factories of Baltimore. Clear skies gave unlimited ceiling, and though temperatures were decidedly lower at 8,300 feet, notwithstanding this particular March day was ideal for cross-country flying, and there was not sufficient heat or cloudiness to produce turbulence or air-pockets, as we experience later in summer.

About this season of the year we have gotten away from the very windy weather of early spring and are entering the transition stage, so to speak, (*Continued on page 262*)

CREATIVE AIRPLANE SELLING TO BUSINESS CONCERNS

By Harry Chamberlain

Sales Counsel

AIR PLANES used by business houses have this in common with adding machines, cash registers, motor trucks or any other efficiency devices: They will either *cost* money or *make* money. They will do one or the other—they cannot do both. The airplane salesman must remember that there is only one reason why any business house ought to purchase his product, and that is its need of that product and not his need of a sale. The task of the airplane salesman is to establish a basis for the sale by logical and convincing demonstration of the advantages or benefits to be derived in each particular case.

Salesmanship is the ability to induce a man to *want* what he *needs;* the number of business concerns which are airplane prospects because they need airplanes are infinitely greater than those which simply want them. The great task of airplane salesmanship is to convert the former class into the latter class. Truly, in this field, "Selling is Teaching;" and the best airplane salesman will be the one who can best teach each prospect the advantages of air travel in his particular business. But, before the salesman can teach, he must learn; he must study the other man's business so that he can clearly understand the business reasons for the purchase.

Airplane sales to business houses are made in the preparation—in what the salesman knows about business in general and the prospect's business in particular. This is where the pre-approach is absolutely necessary; the first call should not be to sell airplanes, but to secure information and data. Business is ever hospitable to whatever will enable it to make money or enjoy a business advantage over competition. The desk of the up-to-date business executive is simply a landing field for profit ideas. Moreover, the successful business man is in the habit of coöperating with salesmen selling efficiency equipment by furnishing them the necessary information to determine whether there is an application for their product.

The airplane salesman and sales manager will have to learn the same lesson which the salesmen of every efficiency device have learned; that is, that people never primarily desire the product the salesman is selling. But they do buy when they sufficiently desire the "product of the product." When a man buys a watch, he does not consider that he is purchasing gold, glass, wheels and hands; what he really buys is a service. When a man buys airplane equipment, it is not because he wants wings, engine, wheels or instruments but because he wants a certain service. The airplane salesman is really selling each business house a particular service. By way of illustrating, business houses have purchased adding machines, motor trucks, etc., not because they desired them as such, but to secure the profits through their adoption and the use in their businesses.

It is an old sales axiom that "a sale is not made in the prospect's check book or pocket book or in the salesman's order book—it is made in the prospect's mind." We can add that, before it is made in the prospect's mind, it had better be made in the salesman's mind. It is unfortunate, to say the least, when the prospect asks him to state specifically why he should buy and all the salesman can do is gulp and murmur "wing structure" or "engine." The airplane salesman needs to know all about his own merchandise, but he needs to know equally well a lot about his prospect and his prospect's business problems if he is to sell this new and efficient business tool.

The industry seems agreed that in selling business houses the greatest obstacles are: first, Fear; second, Cost; and third, Ignorance of the application of the airplane to business. Naturally, we fear the unfamiliar and unknown; but as air transport becomes more and more a common experience, the mass of people will cease to bear it. At this stage in the industry, however, it probably is more or less of a factor of sales resistance, but a salesman with a clear and convincing presentation of real advantages at least secures for himself an opportunity to overcome prejudice. Insofar as the objection of "High Cost" is concerned, we must be able definitely to convince the prospect that his new airplanes will pay for themselves out of money which they will make for him—and give him a profit besides. Anything which will bring him larger profit does not cost anything. As for the third objection, an educational method of selling (such as that I am describing) will overcome that ignorance.

Any business can increase profits by increasing sales and decreasing costs. A salesman with an automobile will call on many more customers than one with a horse and buggy. A salesman with an automobile will sell enough more customers to reduce greatly the cost per sale. There is nothing mysterious in the commercial use of the airplane; the only questions are, "In what respects will the use of the airplane increase facilities?" and "In what respects will it create economies?"

In the present early stage of the industry, there are undoubtedly great indirect selling and advertising advantages to concerns which use the airplane. Possibly, there is nothing the salesman can do which will help him more than to imagine he is the prospect and try to figure out the advantages to him of airplane use. A great hotel man, the late George Boldt, the father of the modern hotel, gave as the reason for his success: "I am always able to imagine that I am a hotel guest; then I give my patrons the service I myself would desire as a guest."

A perusal of sales articles indicates that airplane sales organizations give undue importance to "tips" and "leads." Airplane salesmanship, of all salesmanship, must be creative. There will not be enough business if the industry waits for business firms to sell themselves. The initiative must be taken by the sales department, not in finding people who regard themselves as prospects but in ascertaining who really needs airplanes and proving their need to them. The history of the motor truck business proves that practically the only companies which survived and grew were those few that built sales forces which were competent as traffic analysts.

The sales problem of the airplane salesman who is selling to individuals for pleasure or sport and the sales problem of the man who sells to business concerns are quite different. For the former prospect, a salesman of the type who has been selling expensive automobiles is probably suitable. But for selling business concerns for business use, an altogether different type of sales-personality is required. He must be a man with a fairly generous knowledge of business in general, with the ability to gather specific knowledge and data. These he should be able to anlyze so as to build up a sales presenta- (*Continued on page 224*)

MAINTENANCE METHODS

OF THE PAN-AMERICAN AIRWAYS SYSTEM

W. Overton Snyder

Divisional Engineer, West Indies Division

Pan-American Airways, Inc.

"IN air transportation all things are possible." In spite of its optimistic implications, this statement is most often used as a vivid reminder that any air transport enterprise may encounter disaster if there is the slightest lack of farseeing precaution or any diminution of daily vigilance. In this conviction, then, the maintenance department of the Pan American organization has labored to set a standard which precludes failure either of man or machine.

The first necessity for starting any enterprise is a plan. This was provided for the Pan American maintenance department by Mr. Andre A. Priester, who brought to his task a wealth of practical experience, vision, and engineering training. His basic principle, roughly, was that safety was paramount in air transportation, and that, moreover, safety was a true friend to profitable operation. He made it plain that if ample funds of money and of man-power were early invested in the interest of safety, the company would so much the sooner establish itself impregnably in its chosen field, and dividends would be so much the sooner forthcoming.

Pan American operates over such great distances and from such widely separated bases, that each "division" must be practically self-sufficient in daily operation. It was decided, therefore, to put the maintenance work of each division under a divisional engineer working under the general guidance of the chief engineer. The essential qualifications for these positions included extensive experience in aircraft manufacture or operation, and graduation from a recognized engineering university. This set a basic principle in the personnel plan.

Another fundamental decision was to centralize maintenance equipment and supplies so far as possible at one point on the division rather than at a number of smaller bases. As an example of the execution of this policy, Fokker F-10 planes based at Miami now regularly complete a trip of 2,890 miles to San Juan, Porto Rico, and return. They receive a complete, routine fifteen-hour servicing at San Juan, but have all special repair work done at Miami. In like manner, Sikorksy S-38 amphibions based at Miami regularly complete the 1,868-mile trip to Tela, Honduras, and return. Following the same principle, a very complete stock of replacement parts and materials is kept at Miami for issuance to the intermediate stations as required. Of course, the latter stations are all stocked with the parts and materials which experience has shown to be necessary to maintain the airplanes safely on schedule.

Another factor to be considered was whether Pan American planes should be operated at a very low maintenance cost, expecting early obsolescense, or whether they should be kept in a very excellent state of repair, with a view to almost indefinite life. It was felt that, in spite of higher hourly maintenance cost, this latter policy would be most profitable in the end, since ships could be operated in a serviceable condition long after they had been entirely "depreciated" on the books. It was further felt that this policy would tend to keep the mechanics up to a very high standard of workmanship, and that safety would accordingly be served. It is for this purpose of preserving morale that visible copper fuel lines on Pan American airplanes must be highly polished and tires kept painted black, details more of appearance than of mechanical safety.

With the more fundamental policies established, a system of routine maintenance had to be set up. Naturally, any such system varies with the type of airplane, climate, and operating conditions, but general standards can readily be ascertained and established. At every overnight stop every ship, with its engines, is given a "Short Service," which consists briefly in the following steps:

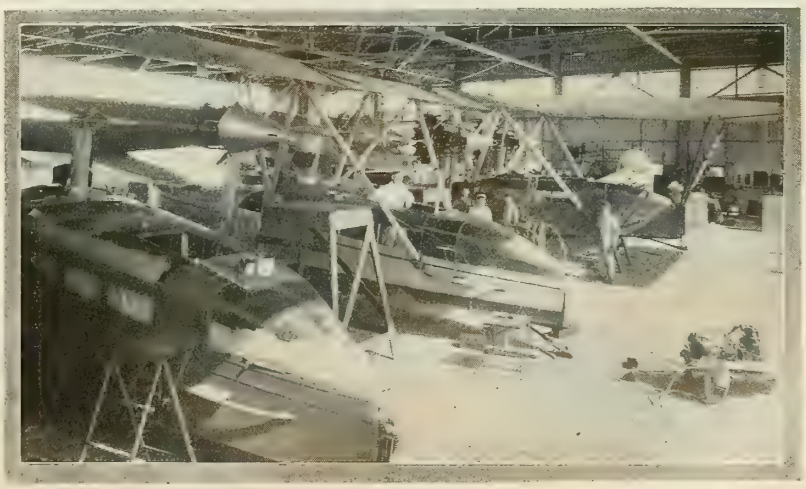
(1) Fill gasoline; (2) check oil level; (3) remove and inspect front spark plugs; (4) remove rocker box covers; inspect and lubricate valve rocker mechanism; (5) remove and clean gas strainers; (6) check rear spark plugs for tightness; (7) check motor mounts, fuselage structure, control system, and safety wire and pins; (8) check landing gear, including brakes; (11) lubricate control hinges and

After fifteen hours of flying time, each airplane, with its engines, is given a "Long Service," which consists briefly of the following steps:

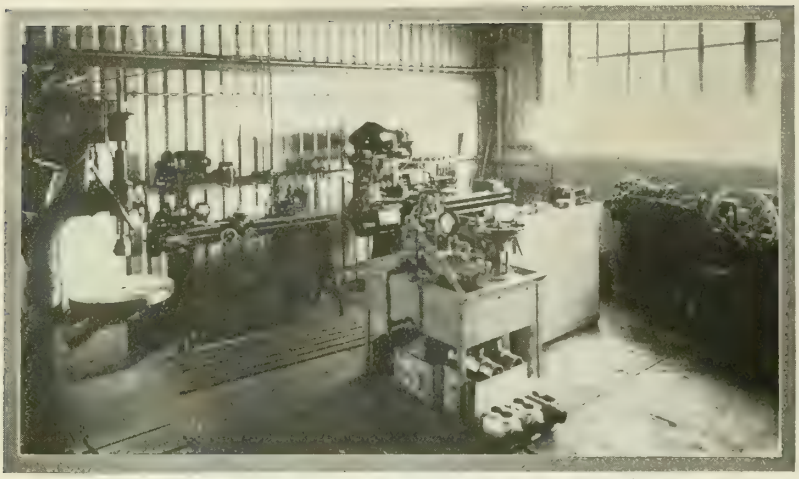
(1) Fill gasoline; (2) change oil; (3) change spark plug; (4) lubricate valve rocker mechanism and check valve clearance; (5) check magneto breaker assembly, especially the points for wear and clearance; (6) remove carburetor jet plugs and flush carburetor, (7) remove and clean gas strainers; (8) remove and clean oil strainers, (9) flush hull and pontoons on seaplanes; (10) inspect and grease landing gear, including brakes; (11) lubricate control hinges and pulleys and clean control cables; (12) lubricate all zerk fittings; (13) clean engines and ship.

After approximately 150 hours of flying time, carburetors are changed, since experience has shown that sufficient corrosion and sediment have collected by this time to warrant a carburetor overhaul.

After 250 hours of flying time the engines, together with



Amphibions undergoing repair in the airplane overhaul hangar at Miami



Machine shop of Pan American Airways at its Miami terminal

all their accessories, and the propellers, are removed for a complete overhaul. At this time the airplane is given a very minute inspection, and all possible repair items completed. After 1,000 hours of flying time the whole airplane is disassembled and completely overhauled. (This period may be somewhat shorter in the case of amphibions, and slightly longer in the case of landplanes.)

When the fundamentals of the Pan American maintenance plan were made clear, there followed the problem of putting them into effect. The way in which this has been done can best be made clear by describing the handling of a ship at the Miami terminal when it comes in from a twenty-eight-hour San Juan trip. As soon as the cargo is unloaded and the engines are stopped, the "line crew," with its tractor and dolly, transfers the ship to the fueling pits and immediately fills the gasoline tanks up to the standard level required of all outgoing planes. The tanks are filled thus immediately partly to prevent undue condensation of water inside empty tanks, and partly to ensure the ship's being ready for flight at any time on the shortest possible notice. While the filling operation is going on, an inspector is going over the ship checking every detail of the entire structure, making note of all defects. Simultaneously, the pilot who brought the ship in has reported to the operations office and then has gone personally to the divisional engineer to explain in detail any peculiarity or fault which he has noted while flying the airplane. Detailed notes of his remarks are made on his pilot's flight report, a copy of which the divisional engineer always receives. In addition to the inspector's report and the pilot's report, information is secured from a "Mechanic's Log Book," a small notebook which is always carried in the ship. In this book the mechanic at each station along the route describes what work he has done while the ship was at his station, and his observations. All of these various sources of information come within an hour to the superintendent of the Miami shops, who uses them all in preparing his "Work Order" for the airplane in question.

When the fueling has been completed, the ship is brought into the hangar and placed with its wheels and tail skid within boxes painted on the floor. The position of each ship in the hangar is scheduled in advance by the superintendent in order that the outgoing ships the next day may be recovered without moving any other ships.

When the ship is in the hangar, the superintendent's Work Order is placed on that plane's individual clip-board and hung on the ship. This Work Order, whether it be for a Short Service or a Long Service, has printed on it the routine items to be executed. Under these are written any special items. Opposite each natural group of items is a space for the name of the man assigned to that job, followed by a space in which he must sign when he has completed the work, followed in turn by a space in which the man's foreman must sign when the work is acceptable to him. Similar to the regular Work Order is a special sheet for the employee who specializes in checking emergency equipment, such as rubber life-rafts, life preservers, safety belts, and Very pistols. This sheet provides space for him to indicate what items he has inspected and what quantity of each item was on the ship when it was finally approved for regular service.

When all of the work has been completed on the airplane, the inspector once more goes over it in every detail, with particular reference to those items which were on his preliminary inspection report and on the plane's Work Order. Each inspector reports directly to the divisional engineer, and is fully empowered to forbid a ship's being put into service until it has passed inspection to his satisfaction.

When the airplane is approved for service, the line crew brings it to the warming-up platform and brings the engine temperatures to forty degrees Centigrade in the usual manner. Each engine is then run up to full throttle, tested separately on each magneto, and instrument readings recorded on a "Final Check" card. In addition to giving instrument readings, this card states the amount of gasoline and oil in the ship at the time of departure, whether or not the emergency equipment was in place, and similar essential details. When this check has been completed,



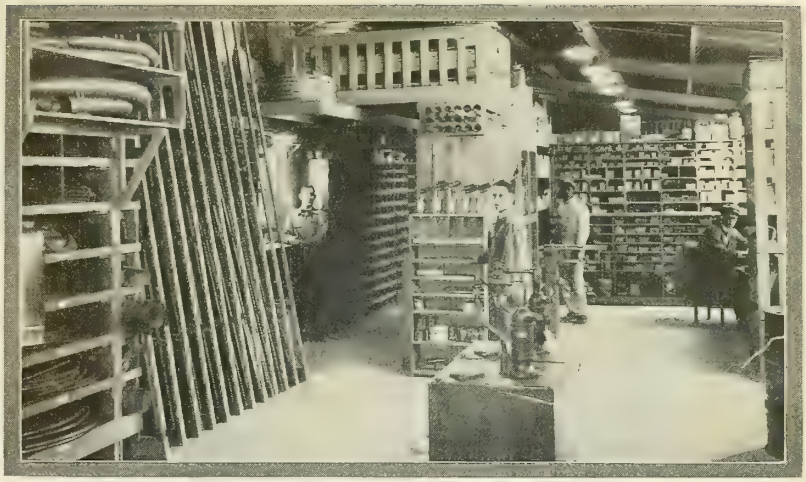
Magneto, carburetor, starter and fuel pump overhaul shop

the engines are stopped and the ship towed to the loading platform at the passenger terminal, where the engines are started again a few minutes before departure time. It is worth noting that Pan American airplanes are always towed on the ground from the landing gear axle, in order to avoid the possibility of excessive fuselage strains involved in towing from the tall skid or tail wheel.

The example used above was typical of a ship performing its regular tour of duty. A somewhat different procedure is followed in the case of a plane which has completed 250 flight hours. The routine work on the airplane proper is conducted as above. The engines and propellers, however, are removed and transferred to their respective overhaul shops. The motors are set up on conventional engine work stands and completely disassembled, the parts being put on a parts rack, of which there is one for each individual engine. This rack is simply a large wooden tier of shelves mounted on castors. Major parts of the engine, such as cylinders, pistons and connecting rods, are tagged in order that they may be reassembled in the locations from which they were removed. All of the engine's accessories, such as magnetos, carburetor, starter and fuel pump, are removed to the accessory overhaul shop, where they are entirely reconditioned and tested. Magnetos, after overhaul and re-magnetization of the rotors, are run by means of an electric motor, their firing qualities being visually inspected on a conventional series of spark gaps. Carburetors and fuel pumps are attached to an overhauled engine and run on an engine test stand before being pronounced fit for flight duty. In the same shop an entirely new shielded ignition harness is constructed, for installation on the engine when completed.

In the meantime, the cylinders are carefully inspected, and the valve guides replaced when necessary. Then the cylinders are scraped clean of paint, repainted and baked, since it has been found that painting over the old enamel reduces the heat-dissipation efficiency of the cylinders and thus materially increases engine temperatures. Finally, the valve seats are reamed down and the valves lapped in by mechanics who specialize on that work. (The valves in the meantime have been refaced on a conventional Kwik-Way machine.)

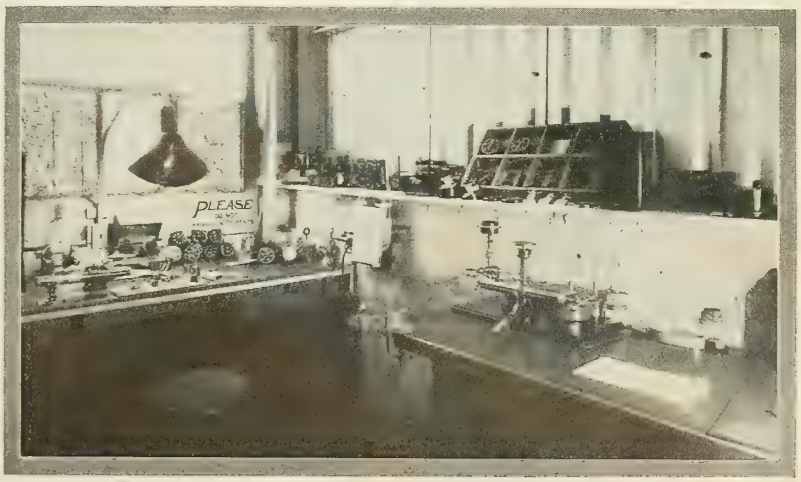
Simultaneously, the internal engine parts have been cleaned of carbon and oil by a combination of chemical baths and brushes, and have been carefully inspected for defects. Whenever shown necessary by checks on dimensions, main bearings are replaced, bushings renewed, or entire new parts procured. When new piston rings are to be installed, they are carefully lapped down to provide proper side and end clearance. Ball and roller bearings are minutely checked both with feeler-gauges and with manual tests for smooth running. When all parts are ready for reassembly, one group of mechanics starts setting up the blower-section, checking each part as it goes in to see that it is within the tolerances published by the engine manufacturer. A number of special tools have been developed by Pan American employees to assist them in this work. When the blower section is completed, it is transferred to another group of mechanics who assemble the main-section and the nose-section. In like manner, all parts which must come within certain tolerances are carefully checked with gauges. Throughout the whole assembly process, all parts are inspected by experienced mechanics.



Section of the Pan American stockroom at Miami, showing serving window

When an engine is completed, it is put on a conventional test stand, driving a four-blade club propeller, and is run for five hours at 1,400 r.p.m., then for an hour at 1,700 r.p.m. and finally for 5-15 minutes at full throttle. During the whole test period, complete instrument readings are taken every fifteen minutes, including cylinder head and flange temperatures taken on selected cylinders by means of a thermocouple. If the engine's behavior has been normal on the test stand, it is installed on an airplane, checked by an inspector, run for an hour on the ground, and finally test-flown for an hour at various speeds in the vicinity of the airport. When all minor adjustments have been made at the conclusion of the flight, the airplane with its newly overhauled engines is pronounced fit for regular flight duty.

Simultaneously with the engine overhaul proceeds the overhaul of the propellers which are to be fitted to the



The shop where airplane instruments are regulated and repaired



P. A. A. shop in which engines are completely overhauled at regular periods

newly conditioned engines. The propellers are first disassembled, the blades etched in caustic soda, and the hub clamps and bolts polished clean. Then all parts are inspected with a magnifying glass for any sign of fatigue-cracks or intercrystalline corrosion. If no such faults are apparent, the parts are reassembled and the blades filed down to remove dents and leading-edge abrasion. Next, the blades are set to the proper angle and the assembly adjusted for track and balance. Finally, the blades are buffed to restore their original polish.

Certain other sections of the maintenance department schedule their work not according to 250-hour overhaul periods, but according to current repair requirements. Notable among these is the instrument repair shop, which is equipped to handle all types of fine instrument maintenance. In its equipment is included a jeweler's lathe and watchmaker's tools, an air speed calibration column, an altimeter calibration bell-jar, a calibrating device for pressure gauges, and a tachometer test stand. Under the direction of a skilled watchmaker, especially trained in aircraft instruments, this shop is able to handle any normal repair and replacement work. The instrument shop is charged with the maintenance of all compasses, for which work it requires a "compass rose" or turn table device for swinging ships. This is simply a circular concrete platform situated a considerable distance from any hangars. At its center is a small turntable on which one wheel of the airplane is placed. The tail of the ship is raised by a hydraulic jack onto a high "dolly" which rolls on castors around the circumference of the concrete platform. The standard method of "swinging" compasses in aircraft is too well known to require further comment. It is interesting to note in passing that, with the type of airplanes now used by Pan American, it is not necessary to run the engines while swinging the compasses. Numerous tests have proved that running the engines has no effect on the compasses. (This might not be true, however, in other types of aircraft.)

Of the other small but important sections of the maintenance department should be mentioned that concerned with spark plug overhaul. It is standard practice in the Pan American System to install completely reconditioned plugs at every fifteen-hour engine service. In being overhauled a spark plug is first completely disassembled and all parts cleaned on motor-driven wire brushes. Then the plug is reassembled and the gap adjusted with a special tool. Next the threads are inspected and a die run over them to remove any possible burrs. Finally, the plug is visually inspected for its firing qualities when under 100 pounds of air pressure. If satisfactory for service, it is given a mark to show that it has been overhauled and is then returned to the hangar for installation in a motor.

A system of airplane repair and overhaul, as distinct from engine and accessory overhaul, cannot possibly follow a rigid routine, and hence cannot be so readily described. One large hangar at the Miami terminal of the Pan American System is devoted exclusively to airplane repair work. It is equipped with an adequate sheet-metal and welding shop, a machine shop, a wood-working shop, a fabric and doping room, and a plentifully-supplied stockroom. It has been found that seaplanes and amphibions require fairly frequent attention, chiefly because of the susceptibility of duralumin to corrosion. This attention ordinarily consists in removing the paint from the hull, cleaning, and repainting, and in uncovering the lower wing structure in order that incipient corrosion may be cleaned away and new protective coatings applied. Obviously, such attention provides an opportunity not only for checking corrosion, but also for an essential inspection of important structural members, such as wing spars and strut fittings. When applied to duralumin operating under salt water conditions, the old saying, "A stitch in time . . ." becomes trebly true. After 750 to 1,000 hours of flight time, each Pan American amphibion is completely disassembled and rebuilt, with new parts when necessary.

The maintenance of landplanes involves somewhat different problems, since ordinary maintenance work is concerned less with the actual structure of the ships than with their accessories, such as control and piping systems. Occasionally, through the agency of a hard landing, for instance, it becomes necessary to make minor repairs on a fuselage, for which work little more is needed than a good welder or sheet-metal worker and skillful engineering supervision. Certain landplanes operated by Pan American use all-wood plywood covered wings which require for their maintenance skilled cabinet-makers. As an example of the work which can be readily accomplished along this line can be cited the case of a seventy-nine-foot wooden wing which was entirely recovered with plywood while still in place on the airplane. When the work was completed and the ship test-flown, it was found to be in excellent aerodynamic balance.

The critical problem in repair work of this kind is not that of getting the work done, but of getting it done safely and efficiently. The first requisites are good material, adequate equipment, and skilled workmen. Equally important is an experienced and able shop superintendent to supervise work as it progresses. Again equally important is a highly skilled aircraft inspector, who can pass on the quality of material and workmanship going into the repair. Finally, and also essential, is the supervision of trained aeronautical engineers who can lay out the general scheme of repair with due regard for stress analyses and the strengths of materials. There must be the fullest coöperation between these various groups if the repair work is to measure up to a high standard of safety.

No mention of a main- (*Continued on page 228*)

I'VE SEEN THE AIR SHOW!

By

by Caldwell

THIS is being written aboard a New York Central train en route to New York. In fact, I got on this train to write this article, because there aren't any room phones on the train. I tried to write it yesterday in Detroit and had to give up. One sentence, one telephone call was about my batting average in the field of literature yesterday. Then there was an hour lost explaining to a little brunette that I couldn't go places and do things, as my public—by which I refer to you six readers—was awaiting the monthly word of wisdom. And then, after I'd shifted her to Shorty Cramer—who seems to be making up for the time he lost at the South Pole—a red-headed woman from Chicago called me up. That sunk me for the balance of the day—and the night.

Anyhow, I crawled aboard this train last night and woke up this morning as we were coming into Syracuse. That's the town where the *Twentieth Century Limited* follows a horse and wagon, or anything else that happens to get on the track in front of it. The main line tracks run right through the heart of the city, and the Limiteds crawl along tooting dolefully for various vehicles to get out of the way. And they never do, apparently. The village cut-up usually selects the tracks as a good place to change the tire on his Ford; and old horses pulling loads of coal invariably pause in front of the trains to rest. They lean up against the engines. Syracuse is a sort of wart on the face of fast railroad transportation. If you ever want to make a hit in the general office of the New York Central, just go up to a vice president and say, "I'm from Syracuse—there's a grand old town!" If you get out alive, tell me what he said.

Riding along like this and writing as I ride reminds me of my fellow-craftsman in words, Arthur Brisbane. He's always going some place on a train and writing as he looks out of the window. That man has sold more scenery to the reading public than any other writer living.

This bird Brisbane is a great booster of aviation. He says it's the coming thing. But so far as I know, it has never come near enough for him to get aboard an airplane. He's mentioned aviation five hundred times; and so far as I know he hasn't flown anywhere once. If he has, I've missed his report of the flight. I'm getting a slight pain in the left optic reading these laudatory remarks on aviation by men who don't use it go any place. Ride more and write less, brother, and we'll make a profit off you. And the same thing goes for these after-lunch and dinner speakers who heave themselves onto their hind legs and pour out grandiloquent remarks about aviation and then ride all the way to Los Angeles by train. I'm off those babies and am as liable as not to hurl a bun at the next one I have to listen to.

Well, after biting a chunk out of the Modocks I'd better explain why I'm in this train instead of in an airplane. I'm here because it's the most convenient, the most comfortable, and the cheapest way for me to go from Detroit to New York. There's a time to use the plane and a time to use the train. You can't go from Detroit to New York by plane and beat a train, either in price or in speed. I happen to be on a train that left Detroit at midnight, because I had to speak at a dinner. Ordinarily, when I travel from Detroit to New York, I take the *Detroiter,* which leaves Detroit at seven and gets to New York at 9:30 next morning. How can you beat that with an airplane? You sleep at night anyhow, so you're wasting no time even if you're one of those things I've heard of and never seen—a busy executive. I know dozens of executives and the only busy thing about them is their secretary. She really works while the boss is telling his friends how rushed he is. But let that pass.

No, I don't see this flying business getting to first base until we can put on night sleepers. There's one answer to the passenger airline problem. We'll be flying from coast to coast, and we won't be transferring to the train at night either. We'll just tell the porter to make up our berth. We'll sit and watch the Follies in New York until 11:30. Then we'll take a taxi and drive to the air terminal, right in the heart of the city, get aboard a plane at midnight, go to bed—and wake up in Chicago at nine o'clock next morning. We'll be flying night sleepers to Chicago in less than five years, or I'm a bum prophet. Perhaps it will be more than five years before we leave from the heart of the city, but we'll do that pretty soon. We'll erect a landing platform above some warehouse district or railroad yard, and we'll fly from that. We won't go thirty miles into the country to take a plane. We'll take it from downtown. That's on the cards. It is perfectly feasible from an engineering standpoint right this minute. It will be financially possible in a very few years.

What the airlines have overlooked is the fact that the average man travels, not by day, but by night. He works in the day, and he travels while he sleeps. If we people in aviation are to get his patronage, we must carry him while he is asleep. There's a fact that walks up and bites us. All these limited trains travel at night. They do as much as they can of the journey during darkness. We must do the same. That's all going to come. Until it comes, passenger air transport is going to be a small thing in the transportation picture.

You take this New York-Chicago line I have mentioned. You tell me about the Alleghenies—they're shrouded in fog half the winter and we can't get across. Leaving blind flying out of the reckoning—I don't think it's safe yet for passenger lines—why cross the mountains? Why not go up to Albany and go along the old Erie Canal that I'm riding beside at this minute? That's a water level route, with not a hill on the right-of-way of this railroad. And if it's thick here, why not go South? Why figure an airplane has to follow a route? Have an alternate route, north and south, for bad weather. Get away from these ancient ideas borrowed from other forms of transportation. A train has to follow a route because that's where the rails are laid. If the weather is good or bad, the train has to ride those rails. The airplane can go where it finds the best weather. It can take a longer route and be delayed, but it can go.

Now just a word of consolation for the airline operator. Are you running at a loss? Are your planes not filled? Well, listen, brother in adversity and sorrow, you are not alone. The New York Central Railroad could crawl into bed with you and cry itself to sleep on your shoulder. Do you know how many passengers are enjoying the comforts of this Pullman car? He stands before you, in all his insignificance, the entire car-full—Cy Caldwell, Incorporated, in person, and alone. This (*Continued on page* 248)

THE PARADOX IN AVIATION PUBLICITY

Blaine Stubblefild

Comet Engine Corporation

DURING the last three years, aviation has been presented to the public as a paradox. Seeking to create a second Romantic Age of Adventure, this time in the air instead of on the sea, many aviation writers have pictured the pilot as a daring Magellan and the airplane as a kind of magi-mechanical device, controllable only by those possessed of a special sixth sense, and not particularly safe even for them. While the fictioners were thus engaged, entertaining their readers with, for example, "The Terrors of the Night Air Mail," aircraft sales organizations were telling the story of practical air services—air mail, express, travel and private flying.

Under these circumstances, it is not surprising that Mr. Citizen continues to sit with both feet on the ground, now and then dictating a few air mail letters, riding on wheels wherever he wants to go, pleased and contented to call himself "air-minded." He is glad to serve on the chamber of commerce aviation committee, to boost for a new airport, perhaps to help back an air passenger line leading into his town. Perhaps he goes to the airport on Sunday and leans against the fence, watching the joy hoppers. He reads aviation news, keeps an airplane paperweight on his desk, and knows the names of the famous fliers. But when the air traffic solicitor calls to sell him an air ticket to the convention, he takes the train or his car; he is not sure about his insurance—and there have been some accidents lately. His son wants to enter a flying school and buy a light plane, but he wants him to wait—he believes planes will be cheaper next year, and perhaps there will be one that will fly straight up from the back lot.

What is the cause of Mr. Citizen's attitude? Did he acquire it simply because accidents happen to airplanes? Not entirely. He knows that all transportation carries with it a certain risk; he has read the much-quoted statistics on the subject, and knows they are authentic. It is plain that if air transport planes can fly five or ten million miles with no, or two or three fatalities, there is no more appreciable risk in the air, with reliable operators, than there is on the ground. If pilots can fly day after day for fifteen or twenty years without serious trouble, then human powers must be equal to the requirements of air navigation. It is not these facts that bother the man in the office, but rather a serious lack of facts. For, directly opposed to practical data published on air transport and aircraft, is the mass of "human interest" material given space in the magazines and in the daily press. Human emotions are, after all, facts —just as statistics are facts. The human interest writers tell the public that flying is an adventure, a wild thrill, a thing closely related to magic. These ideas become very real to the average reader. At the same time, perhaps on the same page, the aviation industry invites him to learn to fly in ten easy lessons, to travel by air as a matter of course; and naturally the feature stories, much more interesting than the plain facts, make the strongest impressions on readers. That is one reason men and women remain passively "air-minded," which contributes little or nothing to the industry of building and selling airplanes. An "air-minded" person is one who subscribes to aviation as a grand thing—for other people.

This state of affairs has been blamed on newspapers and other publishers. After three years of experience and practice, it is said, newspaper aviation editors are in many cases unable to write an article or a news item that will pass the scrutiny of airmen, much less clearly inform the lay reader. Ask almost any person if he can get a clear idea of what actually happened by reading a newspaper account of an interesting flight, or an accident, and he will say that he cannot. It is true that these stories are extremely interesting to a certain class of readers, but they are not always reliably informative.

But is it the editor's or the reporter's fault if they are not correct or clear? It would seem not, for two reasons. First, it would be unreasonable to expect several hundred expert writers on a new and technical subject to develop in so short a period. Second, aviation publicity men themselves are responsible for much of the faulty, misleading news and features that have been published since the public became interested.

That aviation's press representatives are substantially at fault can be learned by any one who will ask newspaper and magazine editors, especially those on trade publications, about the written releases that come to their desks. The editors say that these releases are generally indifferently done, some very bad, and only a few show signs of careful and intelligent workmanship. They are bad not only in method, but in content.

A few examples of the subject matter will show why the stuff has not created confidence in the public mind. Nearly all of the transport companies have sent out eulogies on their pilots, setting them up as heroic and fast-thinking demigods, and listing their accomplishments in some cases as next to the impossible. Who among us would be influenced to buy an airplane for his own use, after reading and believing these stories? The transport companies have also sent out, by the thousand, statements about the emergency use of air transport for the shipment of articles needed quickly at distant places, about the flight of doctors and relatives to the bedside of sick people. Air transport press representatives, over-anxious to get into print, have actually helped the newspapers to make air transportation appear as an emergency service, instead of trying to tone the stories down so as to present airlines as routine channels of business, travel and transport.

In the matter of accidents, it seems to me, some have gone even farther wrong. Instead of going to the telephone, when his company has a crash, and telling the newspapers all the facts as fast as they are available, the publicity man too often goes into temporary seclusion. Thus he leaves the reporters, who have a legal right to the news, to get their "facts" from any persons who may have witnessed the trouble, or from passengers who were in the ship. The resulting story is likely to be about as reliable as a game of parlor gossip, but it is the best that can be found. The only persons who can talk intelligently about what happened have refused to do so. And the editor, being human, does not feel any too much concern about doing the company strict justice, since the company itself is making the job hard for him. And, not only that; he feels that, since the air transport company has retained a man to give him its views, he should be able to depend on that man in times of trouble as well as in happier circumstances. The publicity man rushes to the city desk daily with typewritten hymns of praise for his company's operations and progress, but when there is trouble, (*Continued on page 222*)

THE ART OF PURCHASING

George D. Gillespie

IN VIEW of the large number of airplane manufacturers and other aeronautical companies reporting losses during the year 1929, it would seem advisable to give as much attention to purchasing methods, as a means of conserving capital, as is devoted to sales. Some small operators in particular undoubtedly do not have well organized purchasing departments. The stock clerk, purchasing agent, production manager, office manager, chief engineer, sales manager, general manager and president each do some portion of the buying without regard to a comprehensive consideration of quality, price, transportation rates, the time element, stocks on hand and orders in transit. Much of the advertising literature intended for the purchasing department is handed to other departments in the organization or is thrown into the waste basket. The advertising literature reaching the purchasing agent's desk seldom receives much attention; it is filed in a haphazard manner and rarely brought into use again. Some manufacturers in limited production have not even an elementary stock record index that could inform the purchasing agent of stocks available and the status of orders in transit.

The handicap which such chaotic procedure imposes upon the manufacturer is not difficult to recognize. Especially at this time, smaller producers must zealously avoid wasted effort in all departments, particularly in the purchasing of materials. Moreover, if these companies are to continue in active competition, they must build ships and engines of high quality selling at reasonable prices. It is imperative, therefore, that production materials of as fine a quality as possible be procured at as low a cost as possible. To be able to buy in this way, the manufacturer must have a well systematized purchasing department. Therefore, with the thought that it may prove helpful, I should like to outline my conception of a workable system.

All departments would be required to file requisitions for commodities with the purchasing agent and state on the requisition the date the material is needed. At least an elementary stock record system should be installed in order that the purchasing agent may know the amount of stocks on hand. The purchasing agent would be held accountable only to the general manager or to the president. At a fairly definite time daily, the president and the purchasing agent would meet and decide on major purchases and on any requisitions for commodities upon which the purchasing agent declines to make purchases without more complete information concerning the need and possible future company plans. A similar time would also be fixed for the purchasing agent to meet the chief engineer, that new commodities might be considered by the engineering department before being purchased; for test reports on materials to be studied, and for information regarding the reduction of certain stocks to a minimum in view of possible or pending changes in design. All advertising literature pertaining to new commodities, catalogs, etc., would first be delivered to the purchasing agent and then redistributed when advisable to other departments.

Mastering the art of purchasing involves the assembling of a directory in loose-leaf form. The materials for airplane manufacture may be divided into eight groups: (1) fabrics, treating and finishing materials; (2) furnishings; (3) instruments; (4) landing gear and control equipment; (5) lumber; (6) metals, castings, forgings; (7) power plants and accessories; (8) safety equipment. Each group should be allotted fifty pages and each page should be numbered consecutively through the entire eight groups. For reference, it would be desirable to use the first page of the directory as a memorandum of these groups and to designate the allotment of pages to each group. Insert twenty-six sheets. Each sheet bearing a letter of the alphabet—First sheet A, second sheet B, third sheet C, etc. All commodity entries would be listed alphabetically according to the name of the material. On page A would be aluminum alloy casting, aluminum cowling, aluminum sheets, etc.; on page B would be listed bakelite products, balsa, basswood, batteries, bearings, etc.; to each commodity entry, a page number would be allotted "within the page numbers of the proper group." Thus aluminum, coming within the group of metals, castings and forgings, would be allotted a numbered page between number 251 and 300. In the heading of each numbered sheet should be listed the Name of Commodity allotted that page. On the upper right hand of each numbered and listed sheet should be written Name of Vendor and on upper left should be written State. There should be no space allotted for street address and name of city. At the back of the eight groups of numbered sheets, pages should again be indexed alphabetically, and here should be entered alphabetically the full name of the manufacturer, street address, city and State. With this procedure, it would not be necessary to enter the street addresses and names of cities repeatedly.

Having developed these skeleton forms, the purchasing agent could readily list the information he needed from current magazines, bound directories, catalogues, descriptive literature and current correspondence, with the result that he would have at all times easily available, easily brought up to date, a complete source of information concerning those commodities which make up the bulk of the purchases.

By the conservation of time and with the wealth of information at his disposal, this system would enable the purchasing agent to devote time to getting quotations on each major purchase, and it would enable him to effect important savings.



Taking inventory to ascertain purchase requirements

AIR—HOT AND OTHERWISE

The Detroit Show
Cliff Talks
The N. A. A.

Frank A. Tichenor

THE third annual All-American Aircraft show is now a pleasant paragraph in aeronautical history. It was the biggest and the best exhibition we've ever had. Ray Cooper's statement gives an accurate estimate of the event:

"My reactions are that the show was more satisfactory than any in the past. Never have there been more praise and fewer complaints from exhibitors.

"Detroit was the place for the show as the show was the thing for Detroit. The Raisin Show would fail except at Fresno; the Rodeo succeeds at Pendleton, Ore., but might fail elsewhere; stock shows succeed in Chicago for a definite reason; the Petroleum Exhibition is a hit in Tulsa but would be a flop in Buffalo. Obviously Detroit has an appropriateness for the Air Show."

There's commonsense from one who knows. It ought to give some of the wise boys plenty to think over. Some of the air shows help the industry the way a load of coal helps a horse pull a wagon; this one helped as Cream of Wheat helps little Willie or high test gas a motor's empty fuel tank.

The attendance was good and the management excellent. Both, indeed, were better than that. When the Detroit Chamber of Commerce starts out to do a job, that job gets completely finished.

The eighty-five planes exhibited were worth going across the continent to see. Big and little ships. The biggest—thirty-two passenger—could have flown off with a folding-wing sport plane stored in one of its compartments. Flying boats. Comfortable cabin planes. Amphibions. Training planes. Seven new models never before shown. A hundred or more accessory booths. Detroit as a host city did herself proud, even producing some of the best exhibits. The Packard Diesel engine, for example, took all honors in public interest. Ford had three handsome planes—the big Fokker F-32 had a continuous stream of visitors. Berry Brothers exhibit, in charge of Tom Colby, headed the list for artistic and unusual displays.

Exhibitors got down to the real business of selling planes Planes actually were sold. Ask Bill Mara of Stinson. Question United Aircraft as to the result of its fine display. And many others are qualified to testify. Also, evidence indicated that this show had fewer "hotel parties" than most of the previous exhibitions.

The show was held in the new municipal hangar on the Detroit City Airport. And what a hangar!—largest in the world; cost a million dollars.

The headquarters of the National Air Pilots' Association was crowded throughout the show, and Carl Egge, its ever-pleasing secretary (in other words a really good Egge), added numerous new members to the enterprising group.

Of the whole great aeronautical event it is possible to mention only a few high spots. On the first day seven planes flew seventy-five Federal, State and municipal officials from the Ford Airport at Dearborn. Bill Mayo, Colonel Clarence Young, Eddie Rickenbacker, Alvan Macauley, president of the Packard Motor Company; Stanley C. Knauss, general manager of the Stout Air Lines; Hawley Bowlus, of San Diego, who taught many, including Lindbergh, to glide; Major Thomas G. Lanphier and, as my son would say, all the "big shots" arrived by air on the opening day.

But this is no sky directory. Too many stars to name in just one issue of a magazine.

On Diplomats' Day there were real diplomats, on Governors' Day real Governors—and so on. Even a Family Day on the air show calendar.

One day 1,407 landings were recorded up to 3 p. m. when flying was suspended so that the gliding exhibition could proceed. Clarence Chamberlin's gliding in a plane, "stalling" and "mushing" were noteworthy demonstrations. The night flying pleased every one. The model competitions and awards revealed again the interest which youth is taking.

Of course the ladies were there—an important criterion of the success of *any* enterprise.

The social event of the week was the banquet given by the Detroit Council of Exchange Clubs. Not financially but progressively interested in aviation, the Exchange Clubs of the country realize the importance of aviation to the nation and are making themselves of practical use to aviation. Harvey Campbell was excellent as toastmaster. Other speakers included Eddie Rickenbacker, National President J. P. Muller, Governor W. Green (of Michigan), Edward F. Schlee and William S. Brock.

If any group is capable of putting on a really international show, Detroit beds and boards that group. So let's see that they get it in 1931.

AND now along comes Cliff Henderson, who will manage the 1930 National Air Races at Chicago. Only a weather man who fails to do his stuff could interfere with their success. Here is what Cliff has to say about the Detroit show:

"It amazed me. I knew these boys would make a success, but in my wildest imagination I couldn't visualize a show as great as this. They are wonders."

Now I guess that makes it unanimous. I asked Cliff if he did not think we perhaps were having too many shows and if they may not be a waste of the industry's money and time that should be spent in developing prospects and making cash customers of the .

"You're right," said he, "there are too doggone many shows. They're hurting instead of helping the industry. Two big shows a year would be enough—one in New York and one elsewhere, at a time and place to be selected by the exhibiting members of the Aeronautical Chamber of Commerce and not by the show committee."

Here's a good idea and it should be adopted by the Chamber at once. It would save a lot of bad feelings among the factions that exist as a result of geographic grouping. Furthermore, it would assure fair play.

I asked him what he had to say about the so-called local shows.

"These are distributors' shows," he replied, "and should be left to the distributors to settle among themselves. If they want to put on shows, they'll find ways to make them creditable to the industry and to the regions in which their sponsors are interested. (*Continued on page* 224)

JOUKOWSKI'S VORTEX THEORY of PROPELLERS

(Part II)

Dr. Michael Watter

ANY abstract propeller theory considers the case of an isolated propeller in a free stream of air; i.e., without any extraneous body which could possibly alter the condition of airflow. In practice, however, the airflow behind the disc is usually obstructed by the fuselage, engine nacelle, wings, etc. Experiments have shown conclusively that the effect of the bodies placed in the propeller stream is considerable and must be taken into account in the evaluation of propeller characteristics. R and M No. 956 by Lock, Bateman and Townsend gives a method by which this effect can be accounted for. This method consists fundamentally of correcting for each radius value of $\lambda_r = V/nD$ by the use of proper coefficients which necessitate the knowledge of such coefficient for a given type of body. In order to obtain an approximate effect of the body, Mr. Alexandroff attempts to obtain a general coefficient by assuming that the influence of the body causes a certain decrease in air speed which is taken constant across the propeller disc. It is assumed that the propeller functions in an airstream having speed V^1 which is related to the actual speed V by the following expressions $V^1 = V/(1+\varepsilon)$.

This means that in order to obtain the characteristics of a propeller in presence of a body, the characteristics of an isolated propeller must be shifted parallel to the axis of λ to correspond with new value of $\lambda^1 = \lambda(1+\varepsilon)$ which results in an equivalent change in propeller efficiency:

$$\eta^1 = \frac{TV}{P} = \frac{\alpha_a}{\beta_a}\lambda^1 = \frac{\alpha_a}{\beta_a}\lambda\,(1+\varepsilon) = \eta_a\,(1+\varepsilon)$$

where subscript "a" refers to an isolated propeller. Since the magnitude of ε is always positive, η^1 is always greater than η, and for a fuselage with an unusually large cross-sectional area it may exceed unity. It must be borne in mind that η^1 cannot be considered as the propeller efficiency since the resistance of the bodies placed in the slipstream is increased by a certain amount which must be taken into consideration. Indicating with R the total resistance of the body in presence of the propeller and with R_0 the increase in resistance due to the propeller airstream, the true propulsive efficiency can be expressed as follows:

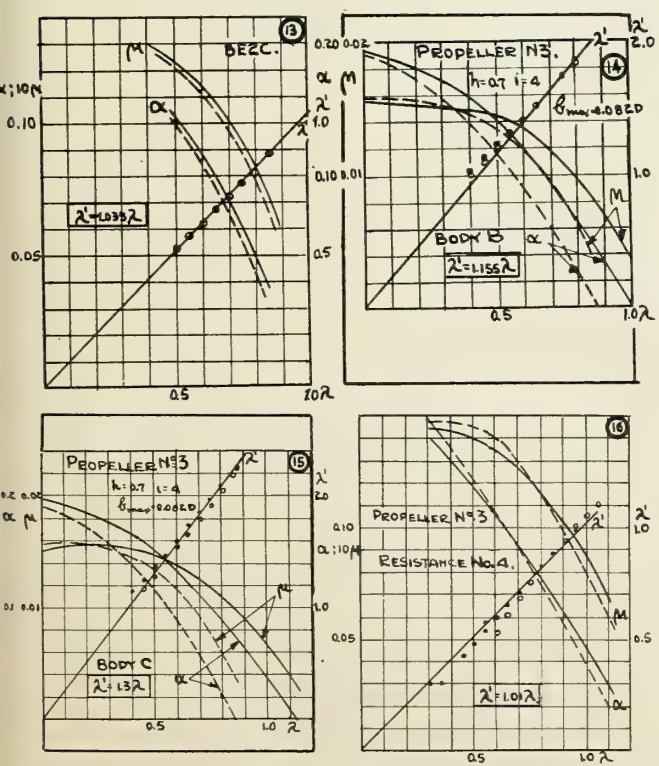
$$\eta_t = \frac{[T-(R-R_0)]V}{P} = \frac{TV}{P}\left(1-\frac{R-R_0}{T}\right)$$

In order to find the magnitude of R_0 the theory of "ideal propeller" may be resorted to, or, what is better still, the available experimental data.

In order to find the magnitude of ε a study was made of British and American tests, the results of which are given in Figures 13 to 17 inclusive. It is interesting to note that λ^1 is very closely a linear function of λ. The coefficient ε is a function of the form of the body and the relative size of the body and the propeller disc. The results of the experiments were interpreted in two diagrams, Figure 18 giving the magnitude of ε for tractor propellers and Figure 19 for pusher propellers. The value of ε is expressed as a function of the factor $\frac{\delta}{F}\sqrt{\frac{S}{F}}$ where $\delta = \frac{C_D S}{0.64}$, S being the cross section of the fuselage while F is the propeller disc area. One may use for tractor propellers the value of ε given by the following formula:

$$\varepsilon = 5\frac{\delta}{F}\sqrt{\frac{S}{F}} \qquad \text{while for pushers} \qquad \varepsilon = 3\frac{\delta}{F}\sqrt{\frac{S}{F}}$$

The above theory giving the characteristics of an isolated propeller, and corrections which must be made because of disturbances created by foreign bodies placed in the air stream, cannot be expected to check the experimental results unless the propeller preserves its form for different conditions of flight. This is very seldom true, and consequently the problem of form rigidity and strength is of vital importance and must be given due consideration in propeller design.



The Nomographic Chart

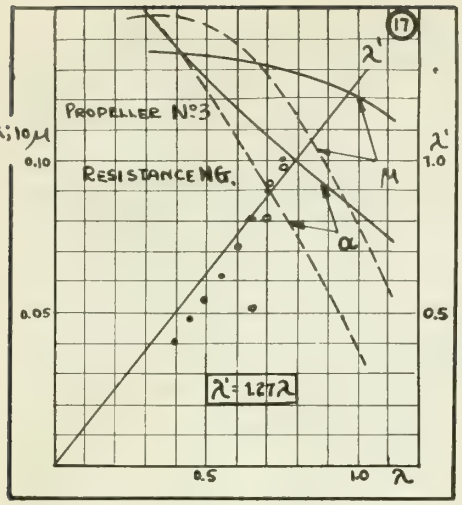
In drawing his nomographic chart, Mr. Kousmin assumed that the coefficients of a wing of a finite and infinite aspect ratio are related by the following formulae:

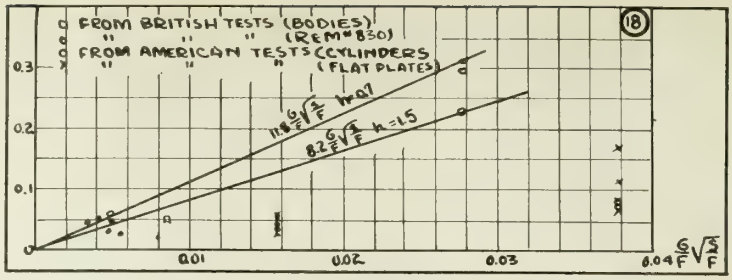
$$C_L = C_{L\infty}$$

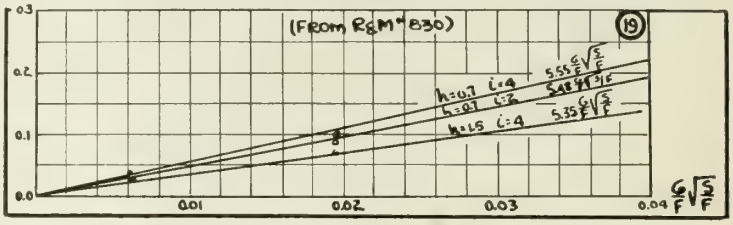
$$C_D = \frac{2}{\pi\lambda}C_L^2 + C_D$$

$$\mu = \left(\frac{2}{\pi\lambda}C_L^2 + C_D\right)/C_L$$

These formulae are sufficiently close for aspect ratio $\lambda = 5$ or 6, resulting in an error not exceeding one per cent. For values of $\lambda = 2$ or 3 the error becomes quite large.







The total inflow speed $\bar{w}$ is equal to

$$\bar{w} = \frac{u}{\sin\beta} = \frac{J}{\bar{r}\sin\beta}$$

but since

$$\bar{J} = C_L \bar{b} \bar{W}_1$$

we have

$$\bar{w} = \frac{C_L \bar{b} \bar{W}_1}{\bar{r}\sin\beta}$$

and

$$\tan \Delta\alpha = \frac{\bar{w}}{\bar{W}_1} = \frac{C_L \bar{b}}{\bar{r}\sin\beta} \quad \ldots\ldots 10$$

Solving (8) and (10) we obtain

$$C_L \frac{\bar{b}}{\bar{r}} = \tan \Delta\alpha \sin\beta \quad \ldots\ldots 11$$

$$\frac{\alpha_1'}{(\pi\bar{r})^3} = \frac{\sin 2\Delta\alpha \sin 2\beta}{4\cos^2\gamma} \quad \ldots\ldots 12$$

In the lower left corner of the chart is given a simultaneous solution of the equations (11) and (12). We notice that for this purpose on the horizontal axis are reproduced values of $\frac{\bar{b}}{\bar{r}} C_L$ while on the vertical we find the true angles of attack β^0.

In the lower right corner the profile drag (equation 9) is taken into account. Knowing the true angle of attack β and value of $\frac{1}{\mu} = \frac{C_L}{C_D}$ we can determine the magnitude of $(1-\mu\tan\beta)$ which takes into account the influence of friction and relative efficiency η_{r_0} of the profile.

Propeller Analysis

Having available the drawing of the propeller for any given value of the relative radius $\bar{r}$ we have

(1) The blade width b

$$\frac{b}{\bar{r}} = \frac{ib}{4\pi r}$$

(2) The relative airfoil thickness

$$C = \frac{t}{b}$$

where t is the maximum thickness

(3) The blade setting θ

$$\theta = \arctan \frac{h}{\pi\bar{r}}$$

where h is the relative pitch. Given this, we want to determine the thrust, power absorbed and propeller efficiency for a given value of $\lambda = \frac{V}{nD}$. We determine the value of

$$\gamma^\circ = \arctan \frac{\lambda}{\pi\bar{r}}$$

In order to obtain from the diagram values of

$$\frac{\alpha}{(\pi\bar{r})^3},\ \eta_i,\ \eta_o \quad \text{and} \quad (1-\mu\tan\rho)$$

we must draw on transparent paper curve of C_L versus α for an infinite aspect ratio. Then we must proceed as follows:

(1) In the upper left corner draw a straight line from the origin of coördinates using scale of $\frac{\bar{b}}{\bar{r}}$

(2) By trial and error we find the value of α as follows:

Taking any arbitrary value of α° we move along the horizontal axis the graph of C_L against α° until the point on the lift curve for the assumed value of α° coincides with the straight line $\frac{\bar{b}}{\bar{r}}$. We transport this point vertically down in the lower left part of the chart on the curve corresponding to angle γ, and then moving horizontally to the scale of β obtain its corresponding magnitude. Now we must verify whether

$$\alpha^\circ + \beta^\circ = \theta^\circ$$

If such is not the case we must repeat this operation assuming a new value of α°. Once α° is determined the point of intersection of the vertical with the curve corresponding to the angle γ gives us the elementary ideal thrust $\frac{\alpha_1}{(\pi\bar{r})^3}$ and ideal efficiency $\eta_{i\bar{r}}$. We also write the magnitude of $\frac{1}{\mu}$ for the found value of α°. Knowing β° and $\frac{1}{\mu}$

from the lower right corner of the chart, we obtain the relative propeller efficiency η_0 and $(1-\mu \tan \beta)$.

The elementary thrust, power coefficients and efficiency are obtained from the known relations

$$\alpha^1 = \frac{\alpha_1}{(\pi \bar{r})^3} (\pi \bar{r})^3 \quad (1 - \mu \tan \beta)$$

$$\eta_r = \eta_i \eta_0$$

and

$$\beta^1 = \frac{\alpha^1 \lambda}{\eta_r}$$

Repeating this process for several radii we can construct the curves of α^1 against $\bar{r}$ and β^1 against $\bar{r}$. Integrating these curves we obtain the total thrust and power coefficients α and β and propeller efficiency

$$\eta = \frac{\alpha}{\beta} \lambda$$

Propeller Design

Assuming value of the design speed V_d and propeller diameter D we determine the power coefficient β and relative pitch λ

$$\beta = \frac{HP}{\varrho n^2 D^5}$$

$$\lambda = \frac{V}{nD}$$

The propeller efficiency can be written as $\eta = \eta_i \eta_0$ where

$$\eta_i = \eta_0 \eta_u = \frac{2}{1 + \sqrt{1 + \frac{8}{\pi} \frac{\eta\beta}{\lambda}}} \cdot \left(1 - \frac{4}{\pi^3} \frac{\eta\beta}{\lambda}\right) \quad \ldots\ldots 13$$

and

$$\eta_0 = \frac{1 - 2\mu \frac{\lambda}{\eta_i \pi}}{1 + \frac{2}{3} \mu \frac{\eta_i \pi}{\lambda}} \quad \ldots\ldots 14$$

Where $\mu = \frac{C_D}{C_L}$ for infinite aspect ratio.

The value of propeller efficiency is assumed from available data and checked by formulae 13 and 14. Using this calculated value of η as a second approximation and determining again its magnitude from equation 13 and 14, the latter value of η will be found sufficiently close for all practical purposes.

Knowing η we can calculate the magnitude of α

$$\alpha = \frac{\eta\beta}{\lambda}$$

Taking due account of the strength of the section, we can choose the airfoil sections and obtain values of α, β and η similarly as it was done for the case of propeller analysis.

This chart greatly simplifies the work involved in the design or analysis of a propeller, and it can be used to advantage in every-day routine work.

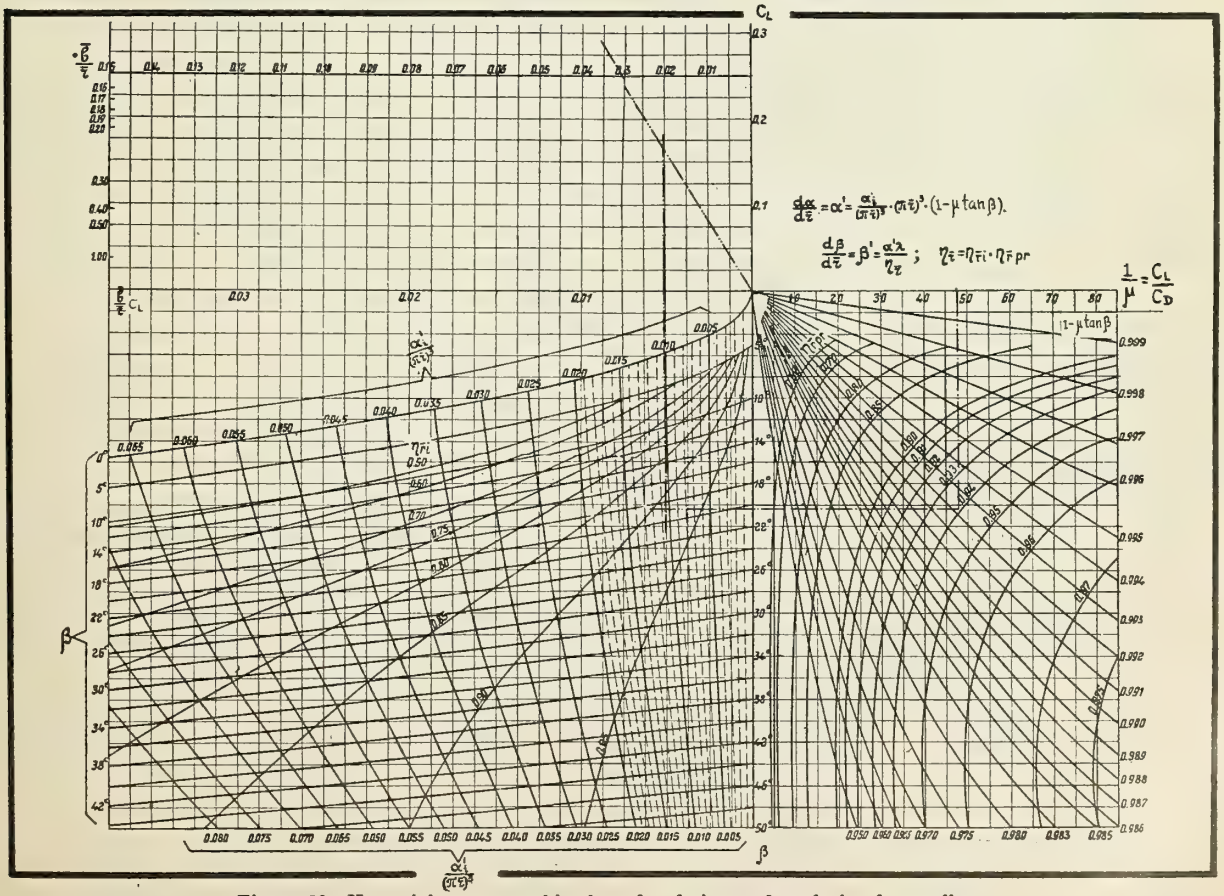


Figure 20—Kousmin's nomographic chart for design and analysis of propellers

The CREDO of a SERVICE PILOT

Lieut. Horace S. Mazet

SO much inconsequential and untrue balderdash about the airplane pilots of the service reaches the average reader through newspapers, periodicals and other channels that perhaps after all a bit of first-hand knowledge concerning this solitary type of individual and his beliefs would not be amiss.

Can we be hoping too much to catch a glimpse into the minds of service pilots by cold-bloodedly reviewing his dogmas and convictions? Perhaps—for who, even when he might corner one of these migratory creatures, can reasonably expect to learn what the pilot, as a service man, thinks? Or do not service men think? That citadel of aeronautical importance, the Department of Commerce, claims that all aviators must think else they soon cease to be aviators. Ergo, there is thought to be discovered in the service, here and there.

Searching high and low, particularly high, for the vagrant thoughts, I finally corraled and tabulated for the edification and erudition of those who believe that the Limitation of Armaments is inevitable, including a reduction in aviation appropriations, what have sometimes passed for thoughts among service pilots, who inform me their belief is:

That military aircraft are immeasurably superior to commercial planes.

★ ★ ★

That the public believes all service pilots are stunt pilots par excellence.

★ ★ ★

That all service pilots are stunt pilots par excellence.

★ ★ ★

That lighter-than-air craft are all experimental and maintained for joy-rides by department heads and ranking officers who must secure their four hours per month aloft but who are wary of airplanes.

★ ★ ★

That the public believes that in event of invasion by a hostile nation, our air force is adequate for any size engagement and can whip any enemy in a day or two.

★ ★ ★

That in the event of invasion by a hostile nation our air force is inadequate, poorly equipped, under-manned and totally unsuited for actual combat work, and would be rendered *hors de combat* in short order.

★ ★ ★

That no other service pilot in the world is as brave as the American.

★ ★ ★

That aviators are underpaid.

★ ★ ★

That promotion is a myth.

★ ★ ★

That aviators in other branches of the service are snooty and prone to put on the dog.

★ ★ ★

That aviators in other branches of the service are lady-killers in their own minds, but in reality are superficial individuals who had sufficient low cunning to manufacture alibis and get through the training course.

★ ★ ★

That Al Williams is the world's greatest speed pilot, but has had rotten luck.

★ ★ ★

That Jimmie Doolittle is the best flier in the world.

That women pilots are to be assiduously avoided, and talked about deprecatingly, if at all.

★ ★ ★

That Germany produces the best commercial planes in the world, and probably has under cover somewhere plans for the best military aircraft.

★ ★ ★

That aerial transportation is the coming industry, with or without the aid of Wall Street.

★ ★ ★

That Wall Street is bearish on all aeronautical stocks for its own selfish purposes.

★ ★ ★

That commercial aviation, because of the above fact, is now retarded far behind commercial aviation in European countries.

★ ★ ★

That St. Louis has a good publicity department.

★ ★ ★

That what the Navy needs is a few large airplane carriers.

★ ★ ★

That what the Navy needs is many small carriers.

★ ★ ★

That if the Government expects to retain its service pilots it had better wake up and increase their pay.

★ ★ ★

That any commercial airline which is reported to be paying its pilots from $700 to $1,000 per month is crazy, or somebody is a liar.

★ ★ ★

That the wives of all aviators are fatalists.

★ ★ ★

That all crash reports in newspapers are grossly exaggerated and given undue publicity because the editors think that is what the public wants.

★ ★ ★

That no newspaper reporter dealing with airplanes and aviation in general knows what he is talking about.

★ ★ ★

That what the movies need, if they only know it, are more pictures like "Flight" and "The Flying Fleet."

★ ★ ★

That Marine aviation in Nicaragua is an observation pilot's paradise.

★ ★ ★

That night air mail pilots are nervy chaps.

★ ★ ★

That girls are thrilled (particularly the good-looking girls) to know military and naval aviators, and spend hours talking about them to their less-fortunate friends.

★ ★ ★

That the biggest thrill of all would be to zoom the old home town and flatten the mayor in the middle of Main Street.

★ ★ ★

That there is still someone who has not heard the story about the student who pulled another stick from his sleeve and landed the ship safely while his instructor jumped.

★ ★ ★

That no cabin plane could be as much fun to fly as an open-cockpit job.

★ ★ ★

That it's good for the complexion to fly in the rain, but very unpleasant.

(*Continued on page 242*)

AERO DIGEST

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ADMIRAL MOFFETT'S COURAGEOUS WORDS ON NATIONAL DEFENSE

WHEN Admiral Moffett returned from the Naval Conference, he spoke freely and wisely, thus once more demonstrating that he is entitled to be called an intelligent defender of the nation who does not fear even the politicians in Washington. He omitted no topic which he thought deserved comment.

The part of his statement of greatest interest in aeronautical circles concerns our REAL national defense, with which it is evident that he, old sea dog though he is, now very slightly associates surface naval ships.

Naval ship parity with Great Britain cannot give the United States actual parity, more because of her merchant ships than because of her naval bases. Merchant ships can be roofed over and converted into airplane carriers, and Britain has the merchant ships while we have not. Fighting planes, Moffet says, can be built much faster than fighting ships. We know it, but few naval men will acknowledge it, as he has done.

A merchant ship adapted for carrying planes is transformed into a long range fighting ship of potentiality unknown in earlier days. And Admiral Moffett urges us therefore to build more merchant ships and planes. Such is his reaction to the necessities of our naval defense. And Moffett quite obviously is not entirely imbued with the thought that the Naval Conference has particularly served the interests of the United States. What we need is planes, and ships to carry them where they are needed.

GASOLINE TAXATION LOADS

FRANK PHILIPS, president of the Phillips Petroleum Company of Bartlesville, Oklahoma, is conducting an intelligent campaign throughout the country to prevent certain States from taxing gasoline used for aviation purposes and to induce other States already taxing aviation fuel, to eliminate such a tax.

It will be wise for the industry to coöperate with Mr. Phillips in his reasonable suggestions. Different State tax policies in this matter are as disconcerting as different State policies with regard to other regulations governing aviation. Pilots and aircraft owners frequently suffer as the result of differing State policies. Even where rebate of the regular gas tax is allowed when the fuel is used in aviation, the formalities of getting it often entail delay at landing fields, thus nullifying the very object of air transport—speed. Other States, which offer no refunds, boast that the tax is used for good roads purposes and other non-aeronautical activities.

Mr. Phillips' suggestion, backed by a large group of pilots and aircraft owners, is that all heads of State governments consider a uniform tax policy which will exempt aviation from such a gasoline tax as must definitely work hardship upon it, or that, if a tax is levied, the proceeds shall be applied toward airway or airport developments which naturally would help the pioneering enterprises to build prosperity for the United States.

Sixteen States now tax aviation gasoline, providing for no refund, applying the proceeds to highways and other matters quite non-aeronautical. Twenty-three rebate, but under different policies, some allowing for evaporation and shrinkage, a few rebating only when purchases are made in quantities of specified and large amounts.

The State of Georgia, however, deserves especial credit. There Governor L. G. Harding recommends to the legislature consideration of the total exemption of aviation interests from payment of the gasoline tax.

UNSOLD AIRPLANES

ACCORDING to a recent survey, there are approximately 1,100 unsold airplanes in manufacturers' warehouses. One manufacturing organization alone, it is reported, is holding nearly 700 of these ships.

These figures do not indicate necessarily that there has been an over-production. It seems more probable that there has been the wrong kind of production. The types of machines in popular demand have been changed rapidly by altered airline economics, new requirements of private owners and design improvements. The manufacturer who in 1927 and 1928 built up-to-date machines cannot expect to market those same planes in 1930. He cannot reasonably expect to receive from prospective purchasers that consideration given to manufacturers who maintain a reasonable production schedule because they foresee improvements certain to come and realize that last year's planes will not sell as readily as new and improved models.

In fact, the effective manufacturers are careful not to over-estimate the real demand. At this moment, in the whole United States, less than three hundred late models are ready for delivery. With proper merchandising methods these can be sold before this spring merges into next summer.

The apparently "worst" features of the sales situation should not be held against the industry. Many of the conditions which apparently make it "bad" would make any business bad in which they were duplicated. A locomotive company could not today sell engines built on its 1914 model, and the locomotive is a thoroughly established device, entirely out of the experimental improvement stage —which cannot be said of the airplane. The mistakes of the shortsighted should not be held against the market's future possibilities.

THE NAVAL CONFERENCE

THE Naval Conference is over and it does not really matter, we believe, except that the expense attendant upon America's participation has also ended. The conference has not decreased our peril from abroad; it has not reduced our naval costs; it has not done anything worth while except to keep us in line with other nations which remain the slaves of ship tradition.

"London forecasts the doom of battleships," is one comment by Arthur Brisbane, thoughtful columnist. As a

matter of fact the doom of battleships was sealed when Wright flew at Kitty Hawk and when our Army planes sunk the junked German ship down by Hampton Roads. When nineteen Army planes recently flew in formation to a height of almost five miles over California and completed their maneuvers perfectly in spite of the severe cold, the futility of surface navies in future hostilities was once more strikingly evinced. That flight meant more as far as warships are concerned than the entire London conference.

It may be uncomfortable for civilians to realize that planes flying at such altitudes cannot be detected by the most skilful observers at ground level, which means that anti-aircraft artillery would be useless as defense against their attack. Nevertheless the fact remains. The only plausible defense, therefore, would be superior groups of opposing planes kept in constant preparation to fend off any such invasion.

The sooner the American public realizes these things and completely stops thinking in terms of surface ships (except as airplane carriers), the safer the United States will be. It has been clearly indicated at London, as well as by air achievements, that naval conferences are now as meaningless as regulations governing covered wagon traffic on modern highways.

BRITTEN, BEWARE!

"I AM ASHAMED of the Navy Department!" said Chairman Britten of the House Naval Committee after receiving a casual routine request from the Navy that thirteen submarines be scrapped. This request was an admission that submarines valued at $12,000,000 had been decommissioned in 1922 after only four years of service, and it startled even Mr. Britten. Three millions a year for construction cost alone for twelve under-water craft to be junked, without considering cost of upkeep and operation while in service—well, it jarred the Congressman.

The submarines were not scrapped because of any splendid international peace motives, but because it was decided that the cost of holding them out of commission would be more than they are worth. The Navy men are shocked because the Congressman sees anything wrong about such methods.

Having brought about these revelations and having denounced the Navy for using public funds to build material which is soon scrapped, Mr. Britten had better be on guard against political assassins. The Navy propagandists are great political fighters even though they be worth but little as military fighters, with present methods. The Navy has many officers we count as friends and admire as men, but we cannot logically agree with their efforts to preserve weapons antedated by modern progress and invention. They have become dangerous to the frank antagonists of their archaic tools. Even those who have arisen boldly among themselves they have smitten rather terribly. Witness what happened to Admirals Sims and Magruder.

And now Mr. Britten had best beware.

FEDERAL GOVERNMENT AID IN LIGHTER-THAN-AIR DEVELOPMENTS

AN INTELLIGENT endeavor to advance American trade along strictly modern lines is indicated by the bill recently introduced by Senator McNary of Oregon. This measure would provide Government assistance in the construction of American commercial dirigibles to operate regularly on existing foreign trade routes. The idea is similar to existing legislation to aid the merchant marine and is at least as reasonable. In the construction of surface ships, we are somewhat handicapped by lower foreign costs of building and operation; but our possession of helium gas would give American airships a definite advantage over those of other nations.

With Dr. Hugo Eckener planning to make his home in America, it seems likely that long-distance air transport by dirigible is to become an increasingly significant factor in our general air development.

AN OUTSIDER LOOKS IN

WE WHO are on the inside of aviation on looking out perhaps can learn as much from those who who are on the outside of aviation looking in as they can learn from us. AERO DIGEST has received an interesting and instructive letter from Royce Chalmers, of the Chalmers Music Company, Miami, Fla., who frankly calls himself an outsider, but adds that he is one of several thousand younger citizens who would like to be in the reverse position. "Sure we want to fly," he writes, but he adds that, before he and his contemporaries go in for the new travel method, the industry must meet certain requirements. Motor car maufacturers have met somewhat similar public demands and have gone over. Before airplane manufacturers go over they, too, must meet them.

His list of qualifications demanded by the would-be buyers is an interesting roster, which every manufacturer might study. It is a non-technical presentment of non-professional demands. Until aviation is available to the non-professional, it cannot become a popular part of everyday life; and until it is just that, it cannot come to its right and proper own. As representative of the layman's point of view, Mr. Chalmers wants:

"A ship that under ordinary circumstances cannot stall or spin; a motor that runs with ordinary gas and oil and is cheap to operate and repair; a delivered price with instructions not over $1,800 completely equipped, and purchasable on automobile terms; at least twenty-five per cent reserve power above cruising speed; full vision, as found in pusher types; well muffled motor exhaust and controllable cabin-heater; cabin jobs as comfortable as that of a similarly priced automobile; an amphibion by preference; a fire-proof job, safe from structural failure."

This writer adds: "Note that I do not mention cruising or top speed, as we want to fly, not race or stunt. We want comfort, safety and beauty; we want to be able to hop in at any time and take the wife, baby and suit case for whatever week-end trip attracts us. We have unlimited faith in American engineers and expect all these things, and when we get them we will see to it that the airports move in ten miles closer to America's average towns and furnish service just as reasonable as that of the average garage.

"When we buy a lizzy, we sometimes prosper and develop into Packard and Stutz buyers.

"Don't forget that the masses gave us roads only after the automobile industry gave us cars which they, the masses, could afford to buy and learn to run with measureable joy and safety."

This letter, in our opinion is crammed full of commonsense. Those interested in aircraft production will find it worth reading carefully.

DON'T FLY UNLESS YOU CAN SEE!

Earle Ovington

Lieut.-Commander, U.S.N.R.

President of the Early Birds

STATISTICS show that flying, particularly schedule transport flying, is comparatively safe, but at this stage of prosperity "comparatively" is not sufficient. Commercial aviation is definitely on trial before the public. If progress is not to be retarded, we must make air transportation just as safe as is humanly possible. And perhaps the quickest way to accomplish this is to discuss frankly the accidents and the remedies to be applied.

By its statistics, the Government has proved—and none of us acquainted with the situation doubt it—that the human element is responsible for the majority of aircraft accidents. I'm glad that this is the case. If we convinced the public that pilots are one hundred per cent perfect, how would we explain the accidents other than to acknowledge there is something radically wrong with the vehicle? We could not consistently make such an acknowledgment for the simple reason that it is not true.

Specifically, I advocate frankness with regard to the cause of airplane accidents. "Hew to the line; let the chips fall where they may." That would be the only square thing to do under the circumstances; and it would be to the benefit of the public, the manufacturers and designers of the ships, the pilots, and the future of commercial aviation. Furthermore, this course, in the long run, would offer the shortest route toward raising the factor of safety in flying.



Gale, in the Los Angeles Times

Every pilot of any experience has witnessed foolhardy flying by his brother pilots. Or inversely, it may be said that nearly every pilot has, at some time in his career, done foolhardy flying. There is perhaps not a pilot living who can truthfully say that this is not so.

I do not refer to the pilot who, equipped with a 'chute, goes up in a military ship engineered, designed and built for acrobatics, and who then "turns her inside out." I refer to the pilot who is supposed to be engaged in normal flying, such as a service pilot on a cross-country hop, the pilot engaged in passenger hopping, or the pilot flying on schedule air transport operations.

Many times during my past nineteen years of flying, for instance, I have seen a pilot just after taking a ship off the field, often with the engine comparatively cold, do a climbing banked turn not more than a hundred feet off the ground, frequently turning with the wind. Of course, we are all trained not to do this, and we all know better. But it is done, nevertheless, at every flying field in the country and too frequently, I'm sorry to acknowledge, by men who should set an example. In justice to the pilot on schedule transport operation, I should like to say that he is not at fault in this particular, although I have seen even him do things which are equally hazardous.

Then again, in case of engine failure shortly after a take-off, many a time I've seen even an experienced pilot try to turn down wind to get into the field again in an emergency landing. This is, perhaps, a most natural instinct, but the training of the pilot, as well as his common sense, should tell him to take what he must straight ahead—except in *rare* instances. Even a steep side-slip, with a crash landing, into the wind with the ship under control, is in most cases preferable to a turn down wind.

In the light of past transport crashes, the greatest error made by the schedule transport pilot is in flying blind under circumstances involving risks greater than the conditions warrant.

Some persons have objected to the use of the word "blind" for such flying, claiming that "instrument" flying is a more appropriate term. I don't agree with this contention. No matter how much we might wish it were otherwise, blind flying is still the correct connotation. The instruments of today are too imperfect to permit us to speak of instrument flying. The "altimeter" is not an altimeter at all; it is merely a barometer. Compasses are not sufficiently reliable, whether they be of the card type or the earth inductor type. The radio beacon is, admittedly, still in the process of development. There is no adequate artificial horizon generally available.

When the altimeter (probably electrical) is more accurate, the gyroscopic compass perfected, and an improved radio beacon system installed on all of the major airways, it will be correct to speak of instrument flying—but not before. From every indication this time is not far off, but it has not yet arrived.

In air transport flying, the question of blind flying is especially pertinent. The pilot with a shipload of passengers should adopt the motto of "Safety First" and apply it at all times; and blind flying is very far from safe under present circumstances. Were I in charge of operations of a transport line, I should repeatedly emphasize this thought. I should admonish my pilots something like this: "I want you boys to get it into your heads and burn it into your brains that "Safety First" is the motto of this company. You'll never be blamed for bringing your ship in late, turning back to the last airport, or setting her down in an emergency field, but look out for your job if you ever bring a ship in under circumstances which necessitate risking the lives of your passengers. *See as you go; or don't go.*"

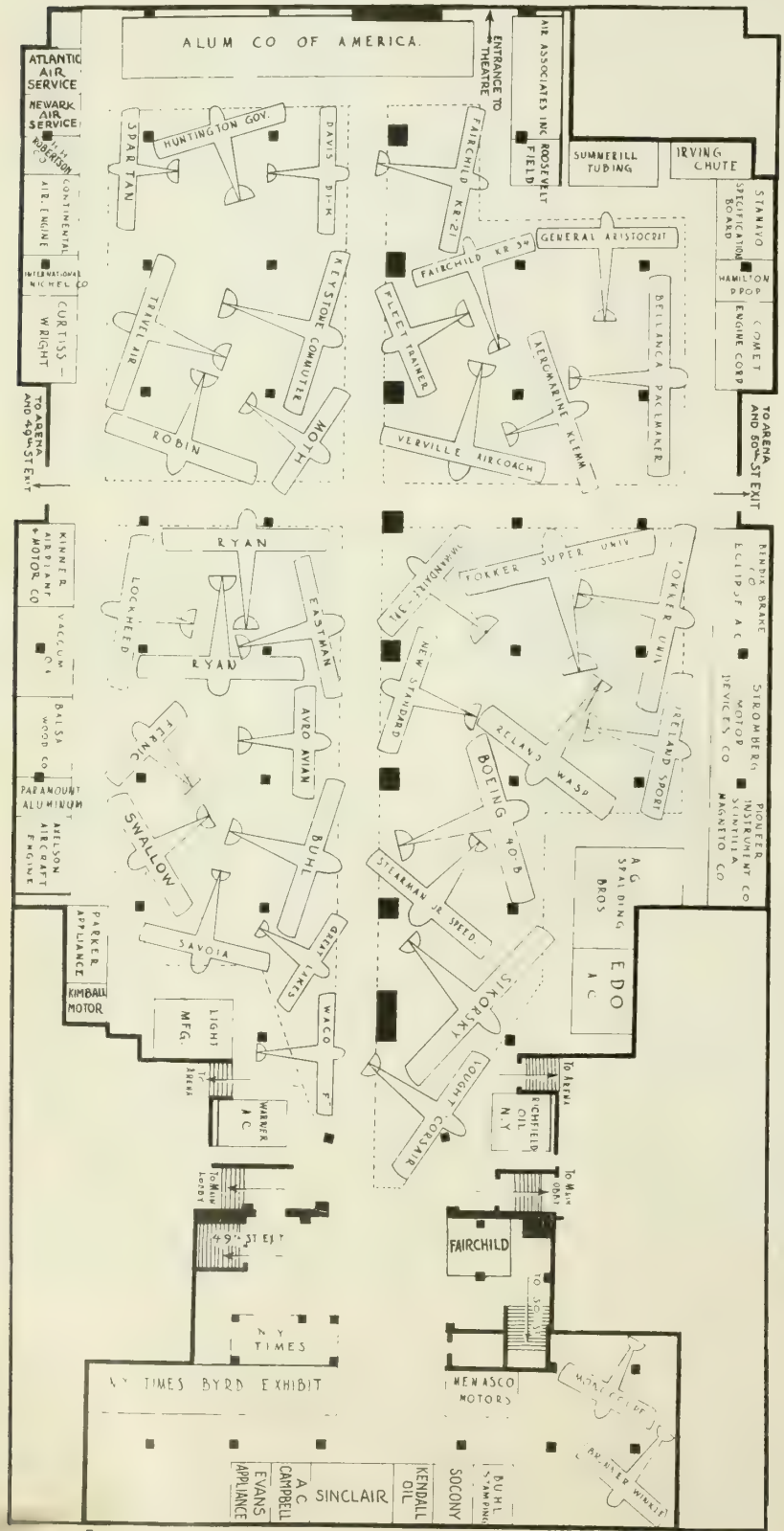
Doubtless, many transport pilots will say: "You're all wet. Many a time I've come through blind and brought my ship in on time. If I had followed your advice, I would have been late, or not brought my ship in at all, and probably gotten fired."

To which my answer is, "You should have followed the advice, nevertheless, and looked for another job. Any concern which permits its pilots to risk the lives of its passengers won't be able to pay your salary very long."

And I am convinced that this is true. Air transportation is on trial, as I have said, and it will be the survival of the fittest—which in this case is the safest. Those transport lines which are backed by a record of safety will be the ultimate survivors.

(*Continued on page* 265)

NEW YORK AIRCRAFT SALON,



Layout showing location of exhibits in the lower exposition hall.

THE New York Aircraft Salon is being held at Madison Square Garden, New York City, May 3-10, and is sponsored by the Aeronautical Chamber of Commerce of America, Inc., under the management of the Aeronautical Expositions Corporation. Approximately fifty planes are on exhibit, in addition to aircraft engines and aeronautical accessories which are being displayed by more than 120 exhibitors. Meetings of the Society of Automotive Engineers, the American Society of Mechanical Engineers, and the Aeronautical Chamber of Commerce are to be held in conjunction with the New York Aircraft Salon. During the week of the show, planes of the Army Air Corps and the Naval Air Service will stage aerial exhibitions over New York City; and a model airplane contest and glider exhibition are scheduled. The salon is managed by Clifford W. Henderson.

Work of rebuilding a section of Madison Square Garden to facilitate the exhibition of large transport planes has been completed. These planes are being shown in the main arena of the Garden, and in addition to the transport planes, the exhibit is comprised of transport engines, aviation radio equipment and booths occupied by operating companies. A mezzanine has been erected on each side of the arena for the display of aircraft and accessories. The main hall located on the lower floor of Madison Square Garden is being utilized for the display of aircraft and aeronautical equipment.

The lower exhibition hall is devoted to displays of light aircraft, of the type designed for sport and training. The exhibition floors and the mezzanine are lined with booths displaying aircraft engines and various accessories associated with the industry. Among the planes displayed in the lower exhibition hall are the Barling, Stearman, Szekely Flying Dutchman, Vought Corsair, Ireland amphibion, Curtiss Tanager, Travel Air, Great Lakes, a Boeing fighter fully equipped with guns, Fairchild, Waco, Gipsy Moth, Avian, Bellanca, Eaglerock, Buhl and Monocoupe. It is estimated that the display of transport planes alone is valued at $500,000 with the general total for aircraft, engines and accessories on exhibit representing approximately $2,000,000.

The decorations of all booths conform with the general scheme throughout the Garden. Airport facilities for planes flown to New York for display at the show are available at the following fields: Roosevelt Field, L. I.; Curtiss Field, Valley Stream, L. I.; New York City Airport, Flushing, L. I.; Newark Metropolitan Airport; and Grand Central Air Terminal, Queens.

The formal opening of the New York Aircraft Salon was scheduled for 8 p.m., May 3rd. The exposition hours are from 10:30 a.m., to 11 p.m. during the nine days of the show. The official days of the Salon are as follows: Inaugural Day, May

at Madison Square Garden, May 3rd to 10th

3; Educational Day, May 4; Air Mail Pilots' Day, May 5; Famous Fliers' Day, May 6; International Day, May 7; Transportation Day, May 8; Army and Navy Day, May 9; and American Youth Day, May 10.

Included in the exhibits which are being held at the salon is the first public showing of photographs taken on Admiral Byrd's flight over the South Pole. These pictures will be part of the Byrd exhibit sponsored by the New York *Times*. Included in this display will be photographs of activities of the Byrd Expedition during the last part of its stay on the Antarctic continent.

A tactical attack of New York City is being staged by planes of the Army Air Corps and the Naval Air Service on five different days during the show as follows: May 3-6 and May 9. The aircraft participating in these maneuvers include forty Curtiss Falcons from Mitchel Field, L. I.; the Navy dirigible *Los Angeles* and the Navy's all-metal airship, the ZMC-2; Navy blimps; and a squadron of Boeing fighters which are to make an 800-mile flight from Hampton Roads, Va. On May 9, ceremonies honoring fliers who contributed to the development of military aviation are being sponsored by the Air Corps and the Naval Air Service. These ceremonies are to take place in the Garden during the salon and the program includes addresses by Rear-Admiral William A. Moffett and F. Trubee Davison, Assistant Secretary of War for Aeronautics.

On May 5, Postmaster General Walter T. Brown participating in ceremonies in honor of air mail pilots, is to deliver an address on "Building Our Air Mail on a Sound Basis." W. Irving Glover, James C. Edgerton, and E. Hamilton Lee are also to participate in these ceremonies.

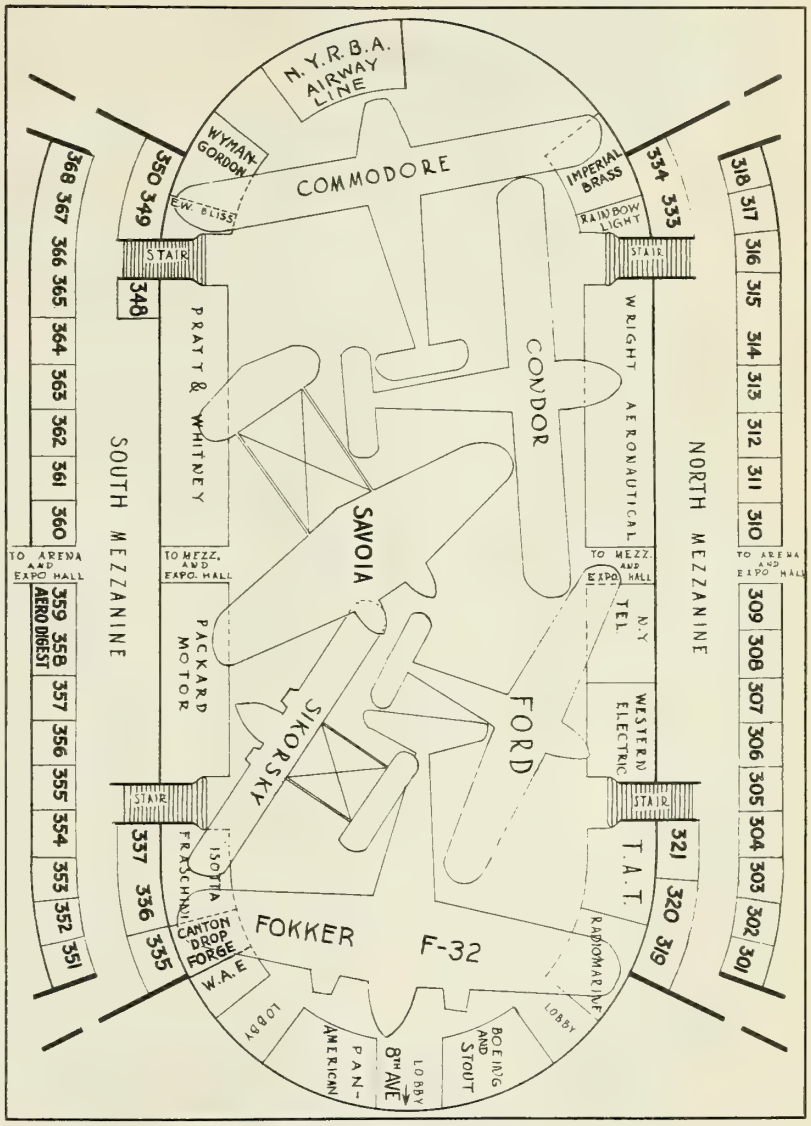
Meetings of the Aeronautical Chamber of Commerce are being held on May 5 and May 6 at the Park Central Hotel in conjunction with the show. The Society of Automotive Engineers is holding sessions at the Park Central Hotel on May 6-7. These sessions are as follows: Aircraft Engines; Marine Air Transport; Aircraft Design; and Research and Experiment. A joint banquet of the S. A. E. and the Aeronautical Chamber of Commerce is being held in the ballroom of the Park Central on the evening of May 7.

The American Society of Mechanical Engineers is holding a session on May 8 at the Park Central at which airplane servicing and maintenance, and airplane economics are to be discussed.

A gliding exhibition is being held in conjunction with the New York Aircraft Salon sponsored by the Aeronautical Chamber of Commerce. On May 1 and 2 a glider meet is being held at Bayside, L. I. A schedule of events for contestants has been organized by the chamber and the same schedule of events is being held on both days of the meet. W. Hawley Bowlus, holder of the American glider record, Lieut. R. Barnaby of the Naval Air Service, and Amelia Earhart are among those who have been invited by the management committee to give exhibitions of glider flying at the meet. Several gliders of the primary and secondary types in addition to sail planes, are being exhibited at the Salon.

Sponsored by the American Sky Cadets, an airplane model contest will be held at the New York Aircraft Salon. Preliminary contests took place during the week of April 19 and the finals are to be held during the show in the Garden. The winning planes of the preliminaries are being displayed at the show.

Thirty-nine airplane manufacturers will exhibit at the salon in addition to eleven manufacturers of aircraft engines.



Location of mezzanine booths and exhibits on arena floor.

Lists of Booths on Mezzanine Above the Arena

(North Mezzanine)

Aero Supply Mfg. Co.	304	
Stewart Hartshorn Co.	305	
Elgin Nat. Watch Co.	307	
Parks Air College	308	
Fleischman Trans. Co.	309	
City of New York	310	
Peaceful Arts Museum	311	
Aviation Engineering	312	
Brenack, Inc.	313	
Aero Model Co.	314-315	
American Sky Cadets	316	
Texas Oil Company.	319-320	
Aviation	333-334	

(South Mezzanine)

Peel Gliders, Inc.	336-337	
N. Y. Herald Tribune.	348-350	
Harwen Products Co.	352	
Walter Kidde & Co.	352	
Egyptian Lacquer Co.	356	
National Air Pilots	357	
Aero Digest	358-359	
Haskelite Mfg. Co.	360	
State of New York	361	
Time, Incorporated	362	
Shelton Looms	363	
National Glider Assn.	364	
N. Y. Herald Tribune.	365-368	

REASONS MOST AIRLINES DON'T PAY

By R. C. Marshall

Vice President and General Manager
Thompson Aeronautical Corporation

THE question of why the air passenger lines do not pay has long remained an enigma to air transport operators. Yet the answers to it are not hidden. The most common explanations advanced to account for the small number of passengers the airliners have been carrying, and for the losses in revenue they are experiencing, are that "Air travel is a new mode of transportation, and people must be educated to it"; or "The tariff rates charged by most companies have in the past been prohibitive." Truly these are big reasons, but they are no more important than a number of others. Before examining some of the latter, however, let us consider what factors have been responsible for high rates, and, in instances in which fares have been reduced, what factors still render it impossible to produce a profit in passenger operations.

One of the principal reasons the air transport operator long felt compelled to place the tariff rate per passenger above the established limit set by other forms of transportation, if he wished to make any kind of a profit, was that he was required to pay an extremely high price for his planes because the manufacturers had to be allowed a profit on their product. Principally because of limited production, the aircraft manufacturer in turn felt compelled to apply to each unit a sales price which would cover the pioneer work of developing that particular plane and engine. Also because of limited production, it has been necessary for the plane builder to write off his overhead in a short period. These conditions naturally have kept the price of flying equipment at such a high level that the airline operator has found it necessary to depreciate each plane and engine very rapidly. For, as yet, it is difficult to ascertain the actual rate of depreciation, since there is no experience to indicate the exact life of a modern plane and engine. Few, if any, ships used on passenger transport lines have yet been worn out. Also, because aircraft are still in the development stage, operators must depreciate their ships before they become obsolete.

Added to the high cost of planes is the accommodation of providing buses for hauling passengers to and from the airports. The expense involved in giving this service has in the past been provided for in the tariff charge. In most cases, railroad companies do not have this expense. Recently, however, several large operators have eliminated free bus service and placed the transfers to and from airports at the expense of passengers.

Another element adding to the high cost of airline operation is the salaries of transport pilots which are usually more than those received by men holding similar positions with other transportation media. From an aerodynamic point of view, the operating cost of passenger planes is high, too. The reason the cost of operating a passenger plane is more than that of a mail plane is that, in the design of the former, primary consideration must be given to the passengers' safety and comfort. Which, of course, means a greater margin of power and a greater aerodynamic efficiency.

Another factor which has undoubtedly played an important part in creating airline operations losses is the factor that some air transport concerns have been operating in the air rather than on the ground; they have had very little knowledge of actual expenses. Passenger fares have been established without comprehensive consideration of costs of operating. In some cases, bookkeeping has been haphazard; guess work has been its substitute.

By reducing fares to a level which might be considered competitive with first class railroad accommodations, some air transport operators hope to eliminate losses by regularly flying fully loaded planes. The representative of one airline, in explaining the reason his line has reduced its fare, said, "The problem of filling the planes is not one of fear but of fare. The 'e' is in the wrong place." On many lines rates have been lowered from as much as fifteen and twenty cents a passenger mile to five cents.

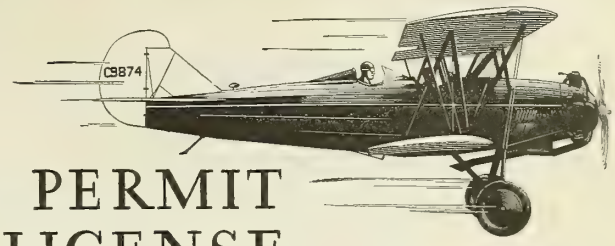
Nevertheless, even with reduced fares and resulting capacity loads, it seems improbable that most passenger operators will be able to realize a profit with present equipment. For example, one of the systems concerned states that the cost of operating the ten-passenger planes on its line is approximately $1.42 a plane mile. For loaded to capacity, these ships are earning but fifty cents a mile. For every mile flown, then, even with capacity loads, this system is losing about ninety-two cents, with the present daily schedule per plane.

Other airlines have brought their operating cost down to $1.25 and $1.20 a mile; but until they are operating planes of greater passenger capacity and are flying on more frequent schedules each day, they probably will be operating at a loss so far as straight passenger service is concerned.

But, it seems to me, something more than low fares must be considered if planes are to continue carrying capacity loads. A combination of factors is involved. Education is one. The public is not yet educated to long trips. Thousands of prospective passengers have yet to take their first ride in an airplane. Others have taken short trips by air but are not yet willing to essay longer journeys. It stands to reason, therefore, that people must first be educated to journeys of 200 or 300 miles before they will attempt longer trips.

Another problem all air transportation companies must overcome is that of fear. There are many who might otherwise like to use the airplane for travel, but personal fear prevents their actually doing so. Moreover, there is the fear one's family has for the individual's safety. In other words, one may have no personal fear of flying, but members of one's family may, and, out of consideration for their feelings, one may not make use of air transportation.

Fear is often caused, to some extent, by the mystery that has surrounded accidents. In the event of such misfortunes, it has been the policy of some companies to attempt to "cover things up", hide the facts and prevent newspapers from knowing and printing their true causes. Perhaps officials of the line concerned felt that, no matter what publicity resulted, it would be undesirable. For that reason they have doubtlessly felt the best procedure to follow was to withhold as much information as possible from the newspapers. Other operators, however, have found it the best policy to assist the newspapers in getting the exact details. This forestalls guess work and thus eliminates the danger of untruths being printed. Most newspapers want to print the true facts. But if the reporters are prevented from getting them, they will seek details from laymen and others who know little or nothing about what might have caused (*Continued on page* 238)



FROM STUDENT PERMIT TO TRANSPORT LICENSE IN ONE PLANE . . . . . TRAVEL AIR

IN the files of Curtiss-Wright are scores of unsolicited letters testifying to the remarkable performance of Travel Air biplanes in all kinds of service. Recently the following was received from Mr. Walter D. Mauk, president of the Western Oklahoma School of Flying.

"I purchased an OX5 Travel Air on January 23, 1929, while I was learning to fly. I soloed in this ship and with it secured my private, limited commercial and transport licenses.

"I've flown it more than 500 hours, in student instruction, on exhibition and barn storming flights. The plane has been exposed to all sorts of weather—flying through rain, sleet and snow. There has never been a structural failure of any kind, and the only replacements were shock cord and a tail skid. I've flown every standard make of 3-place plane and none compares with Travel Air for maneuverability, sturdy construction and reliability."

Why have hundreds of other pilots praised the airworthiness of the Travel Air? Simply because all Travel Air planes are right in design, honestly constructed, and real aircraft values.

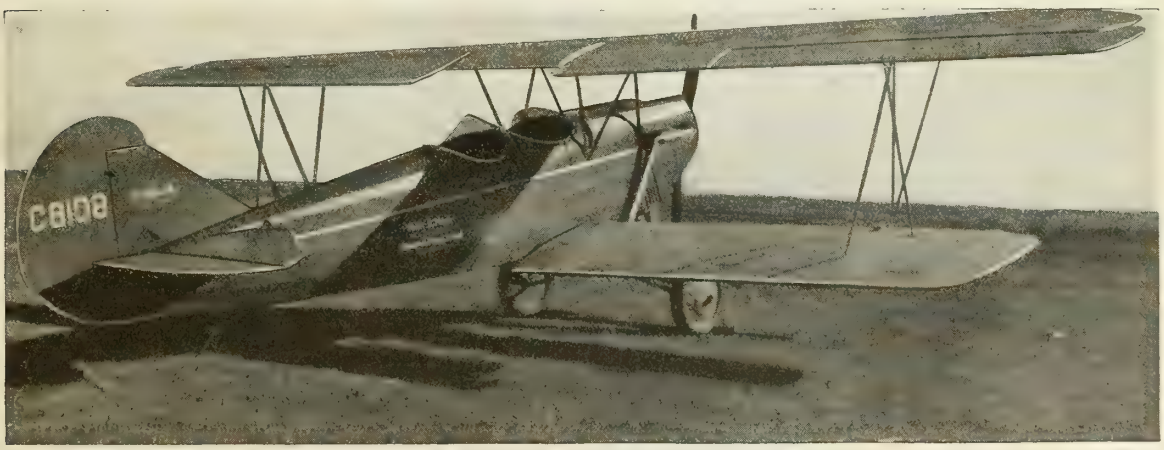
There's a Travel Air for every purpose—for student instruction, exhibition flying, sightseeing, mail and express, crop dusting and photographic service. Biplane models can be had with speeds up to 132 m. p. h., payload capacities up to 780 pounds and cruising ranges up to 690 miles.

The Travel Air 3-place biplane is equipped with Wright Whirlwinds of 225 or 165 h. p., with 150 h.p. Axelson, 110 h. p. Warner Scarab, 100 h. p. Kinner or Curtiss OX5 engine—thus permitting a wide range of power choice.

You can't go wrong in choosing a Travel Air —sponsored by Curtiss-Wright, the world's oldest and largest flying organization. The new low prices now in effect make these planes even greater values. Complete information, with details of operating costs will be sent you gladly. Write today to Dept. T-70

TRAVEL AIR COMPANY
Division of CURTISS-WRIGHT
27 West 57th Street · New York

Travel Air Planes will be on display at the *New York Aircraft Salon*, Madison Square Garden—May 3rd to 11th



A PLANE FOR EVERY PURPOSE TRAVEL AIR

Say you saw it in AERO DIGEST

BUILDING AN EXPORT MARKET

Chris K. Allison

THE basic principles of merchandising are the same the world over. Attention, interest, desire decision and action are the big five of sales effort at all times and in all places. The business of selling American-made goods in foreign markets involves nothing more than a different application of the principles known to and used by the man who sells in the United States. The application differs because there is no other people like the Americans, or for that matter, like the Spanish or the English.

Each country has its own peculiarities. Because of peculiarities, or more properly differences, due to race, climate, geographical position, etc., each foreign country must be regarded by the American exporter as a distinct and separate market unit. It is sometimes necesary to go even further and divide a national group for purposes of advertising and selling into several units.

The business psychology of Latin-Americans, for example, differs from that of North Americans in many respects. Advertising that would be good in Chicago might be totally ineffective in Buenos Aires. A sales program that gets results in North America would probably fail in any country south of the Rio Grande simply because Latin-Americans have no Anglo-Saxon background. for which blessing they are duly and audibly grateful.

It is a very serious and too common mistake for the sales manager from the States to undertake to adapt the market to his organization. He sets out right merrily to destroy beliefs and overcome habits that were rooted and grounded before grandfather was born. We Yankees are nothing if not dogmatic. We are conscious and proud of our efficiency and see no good reason that other peoples should not adopt our methods for the good of their souls and incidentally of their purses.

Successful export selling, like successful selling at home, depends on the product to be sold, the condition of the market, and the quality and quantity of sales effort expended.

In the United States the sales organization has at hand or can secure data covering the buying habits of prospective customers. There is a wide choice of advertising media. The advertiser can secure or prepare a fairly reliable analysis of the buying power, social status and peculiarities of the readers of any publication used or being considered for advertising purposes.

Comparisons are odious, but building a sales organization in the United States is child's play compared with building an export organization. In the first place a great many foreign publications are political organs of doubtful circulation and influence. They are designed primarily for the grinding of political axes. The space is sold for whatever it will bring to whoever will buy it.

American sales organizations in foreign markets are as various as the lines they represent. Some are good, some bad, and some impossible. But because we must have export markets for manufactured wares, our exports organizations are improving. Some of them are very good indeed, so good that their selling costs are lower than could be hoped for in domestic trade.

Selling airplanes abroad is a comparatively new problem. There is no precedent, with the possible exception of that established by the automobile industry. Automobiles and airplanes have much in common—both offer transportation. They differ in that the best market for one is not always best for the other. Airplanes will precede automobiles in many pioneer countries.

Since the advent of flying, the manufacture of planes has grown to the proportions of a major industry. The manufacturers have acquired a market problem that promises to become even more acute in the very near future.

Part of this problem is to develop export markets. To solve this part, various independent organizations have been created for the purpose of selling airplanes in the foreign field. Whether or not these organizations or any of them will succeed remains a matter for speculation. Meantime, we will assume that the manufacturer proposes to handle his export sales with an organization of his own.

The first step, of course, is to select a market. This choice should be made only after a thorough and painstaking investigation which ought to include every consideration that would be included in an analysis of a domestic market. Competition should not be considered as too important. That is, the manufacturer need not hesitate to enter a promising market because the French or Germans are already established there. On the other hand, he will likely find this circumstance works to his advantage.

A large part of the market analysis may be handled by the home office. A great deal of pertinent information can be secured from the Department of Commerce and other sources. Data thus secured should be supplemented by reports from field men who have been instructed to gather only such facts and information as may not be obtained in the United States.

Facts and figures are important, even necessary; but it has not proved a good plan to expend time and money in the collection of figures that are usually misleading and always subject to change without notice. A fairly accurate resumé of the statistical situation is the most that can be hoped for. If exact figures could be obtained, they would be obsolete before any one could base a policy on them.

The market analysis in the export field is not a statistical survey. It is concerned rather with things of more interest and of more importance to the exporter—always admitting that the statistics are important and always declaring that they do not tell the whole story.

First, we make a map of our market—a relief map made of modeling clay or plaster of Paris. Even if the export manager is getting an unusually high salary, it will still pay the firm to let him devote a couple of days to the making of this map; he will be a better export manager and will really know the geography and topography of his market.

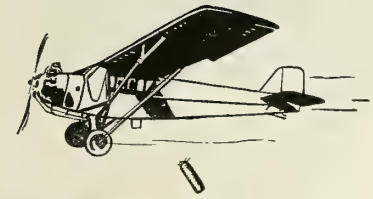
The map is black. Navigable rivers are shown in white. All railways, highways, pack trails and other transportation media are indicated by different kinds of white lines. Small disks of green paper are pasted on the map wherever there are agricultural industries. A small green disk with an "S" on it would indicate where sugar cane is grown. Red disks are used to show metals and minerals.

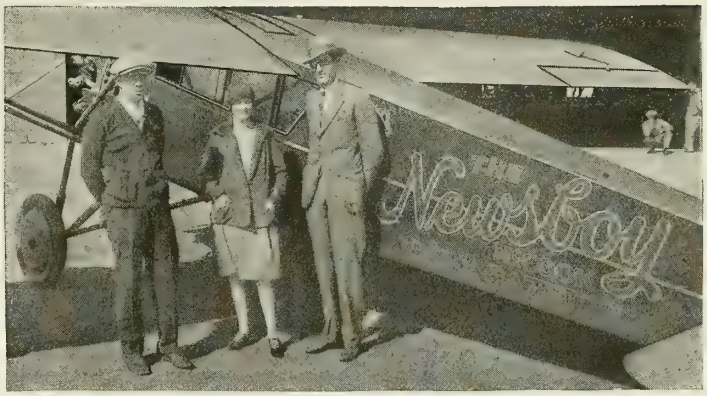
Over here in the corner of Peru is a red disk with "Cr" written on it. There's copper in this corner, but there's no white, meaning no transportation. Some distance away is a thin white line indicating that there is a pack trail a few miles from the copper deposits. We follow this pack trail over the map in the general direction of Lima and the Pacific Ocean. Finally the thin line merges with a broader one indicating a road that motor trucks can use. We follow the motor road till it crosses another white line, a railroad indicated by the

(*Continued on page 232*)

The Robin

peddles the news while it is still news





Flashed from the four corners of the world . . . news comes in over the wires. Reporters on local assignments rush in their copy. Almost with the last click of the linotype machines the presses belch forth first editions. From start to finish, speed is the watchword of the modern newspaper—speed in gathering the news, writing it, printing and putting it into the hands of the reader.

Does H. D. Strunk, publisher of the McCook (Neb.) Daily Gazette, use rail or motor delivery? Not a bit of it. He uses modern transportation methods—a Curtiss Robin. He says "Our Robin is used to distribute newspapers to 40 towns. We fly 380 miles non-stop each afternoon, covering these towns in a little more than three hours and deliver more than 5,000 papers. Only once during the severe cold weather, which sometimes ranged down to 24 below zero, were we forced down—and then by a blizzard . . ."

The Robin is first choice of nationally-known business houses. A cabin monoplane of 3 or 4 passenger capacity, it cruises at 85 to 100 miles an hour. The Robin holds the world's record for endurance and is world-famed for its air-worthiness, durability, comfort and efficiency. The Robin equipped with brakes, and having an unusually low take-off and landing speed, can easily be handled on small, confined fields. Because of its unusual economy—its low initial, operating and upkeep cost—the Robin is a universal favorite among commercial operators. They endorse it as a real profit maker for taxi and charter, sightseeing and training service.

No less important to the airplane owner is the matter of service. Although the Robin seldom requires attention, forty Curtiss-Wright Flying Bases dot the country. No matter where you may be the services of Curtiss-Wright trained mechanicians are not far away. Complete information about the Robin, its specifications and performance data will be gladly sent you without cost or obligation. Simply address Dept. R70, Curtiss-Robertson Airplane Mfg. Co., Division of CURTISS-WRIGHT, 27 West 57th St., New York.



How the Modern Newsboy Delivers the Papers

The newspaper consignment for each town is rolled on the half fold, tied with heavy cord and encased in a heavy sack. Each bundle of papers is stenciled with the name of the town. The bundles are piled like cordwood on the floor of the cabin. One seat has been removed from the cabin. In its position a ten inch hole has been cut for a home-made metal chute through which the papers are dropped at the various towns on the route. Small, cleared fields near the outskirts of towns are used. Their centers are marked by red flags. It is seldom the pilot misses this "spot" by more than fifty feet.

When it is not delivering papers, the "Newsboy" is used for speedy coverage of distant stories, for promotional activities, and some passenger business.

The Robin will be on display at the *New York Aircraft Salon*, Madison Square Garden—May 3rd to 11th

CURTISS ROBIN

For Business Pleasure Training

PERSONAIRLITIES



BY

by Caldwell

MOST of the girls who are in aviation today got there with the help of fathers, brothers or husbands, but here's a little girl from Fargo, N. D., who worked her own way from the ground up. Her name is Florence E. Klingensmith, which, judging from her picture, is subject to change without notice. In fact, I don't understand how the boys of Fargo have let her stay Miss Klingensmith for twenty-three years; they must be a very slow bunch up there.

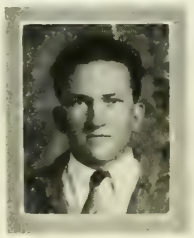
I think Florence must be of German descent, for she has the German manner of putting the verb at the end of the sentence, like this: "Starting out with ground work at an electric school here to get an idea what OX's were, six weeks to the grease and dirt I stuck. Then to flying I must go. But I hadn't money to pay with, so a grease monkey I must be. So from March to June, 1928, I worked, and finally after a little training, a solo flight I made. From then on ticket selling on commission became my specialty, but didn't amount to anything. So the bright idea came to me that parachute jumping I would do. So I purchased an exhibition 'chute and to jumping and wing walking I went. After four shows things turned turtle again, so I sold out and quit jumping. Then to Minneapolis and St. Paul I flew. Soon winter started to close in on me and penniless I was. So home I trailed.

"My next idea was to promote my own plane. After three months of talking, begging, and hard working, I won out. I promoted $3,000 on cold-handed talk and persistency. I got six business men to advance $500 apiece. It took a lot of hard talk and nerve. Course it takes a lot of crust to ask a guy to give you $500 in the winter for an airplane, and not even flying experience, you might say. But nevertheless I have my plane."

We needn't worry about Florence not getting ahead in the world; given a fair shot at a flock of average business men, she could bag the lot. But if I might make a suggestion, Florence, your talents are practically wasted in Fargo. Why not go to New York and turn your efforts on a dozen assorted bears? One airplane is nothing for a girl like you. Go to New York, scare up a few bears, and promote yourself a transcontinental airline or a couple of factories. I'm sure you could do it, easily.

Florence went to Moline, bought a Monocoupe, which was the nearest plane to her size that she could find, and flew it alone to Fargo, her first solo cross-country. Then she took out her private license—when she promoted that airplane she had no license at all! That's why I figure that with the license she can now promote a whole airline. Meanwhile she is running a gas station, flying, and managing the field at Fargo.

HARRY H. PLUMMER entered the Navy as a seaman, was posted to the *U.S.S. West Virginia*, and went to work to become an admiral. And then, unfortunately for the future glory of the Navy, the *West Virginia* steamed into San Francisco. If the Secretary of the Navy had had the least idea that the Navy was to suffer the loss of an embryo admiral through the *West Virginia's* steaming into San Francisco, I am sure that he would have told the captain to steer clear of that port. But, unfortunately, he had not consulted the GREAT BEHNCKE, astrologer, palmist, sooth-sayer and fortune-teller extraordinary to His Majesty the Gaekwar of Baroda, and



Harry H. Plummer



Florence E. Klingensmith

points East; hence the Secretary knew not that disaster was about to overtake the Navy in the loss of one Plummer, A.B.

For the bold Plummer, meeting a young lady of San Francisco, was taken to the Pacific Aero Club and introduced to several pilots and a couple of airplanes. Right there his idea of becoming an admiral passed away. He dashed back to his ship, asked for flight training at Pensacola, passed the medical board, and before he knew it was doing flat turns and being bawled out by a flying instructor. After ten hours, he found himself all alone in the air for his first solo. Is there a pilot in the world who forgets his first solo?

"That bay," writes Harry, "looked anything but inviting; as I flew around it I could see the crash boats at their various stations, waiting patiently. I knew they were watching me, ready to speed out and pick up the remains if I should crash; and I was sure that some were hoping I would crash so they would have some excitement. The general service sailor has no use for the flying personnel. But I disappointed them; I finally got around the bay and made a safe landing. I taxied in to the beach, climbed out of my ship, and was immediately thrown into the bay by classmates. That water is none too warm the last of November. But my consolation was that later I could help to throw my other classmates in, and the water was getting colder every day.

"Next day my two buddies soloed, after which we proceeded to break every rule they ever had at the Naval Air Station."

Those three musketeers, Plummer, Garrison and Douglas, must have been a sore trial to Admiral Raby, a pilot himself and a man who has done much for Naval aviation. One day, for instance, he was looking out of the window just in time to observe the bold Garrison fly between a power cable and a radio aerial. The radio aerial runs from the admiral's office to the top of the flight tower; and the power cable runs from the power plant to the tower, about fifty feet below the radio aerial. And it was through this narrow space that Admiral Raby was horrified to observe one of the Navy's expensive seaplanes being flown by the brave Garrison! He called up the beach and ordered that the pilot of seaplane No. 44 be sent to him immediately, dead or alive. The body was brought in to the Presence, who showed him from the window just what he had done. Garrison said that he had no idea that he was breaking a course rule, upon which Admiral Raby, who is one of the kindest men in the world, said that it was such a nice piece of flying that he would let him off. What Garrison failed to tell the admiral, however,

(*Continued on next page*)





FLYING SCHOOLS FLYING CLUBS—

Both Hail the D. H. MOTH



STURDY for hard knocks and strains of training use—light and easily maneuverable for the sport uses of flying clubs—these are the twin possessions of the D. H. Moth that make it America's most popular light plane.

Flying school operators unstintingly praise the Moth, and their words have the weight of experience. Notable among these messages of approbation is that recently received from Reginald I. Heath, General Manager of Utica Flying Service, Inc., of Utica, N. Y.

"During the late fall and winter months, when flying conditions here are at their worst, we trained many students for private pilot's license. Their average dual time was 9½ hours. The students' proficiency in all stages of training was excellent and their confidence in the Moth universal. From a commercial operator's point of view, having soloed quite a number of students in various types of planes, I know that the anxiety that often prevails while watching a student solo is practically eliminated when the Moth is used.

"The Moth stands up well in training. Owing to its excellent stability, slow landing speed and rugged undercarriage, we have put in 230 hours of student work with our Moth and have not replaced a single part.

"It is interesting to note that during the first week of January, after eighteen inches of snow had fallen and our field was passed up by the mail pilot, the Moth was taken out and flown with wheel landing gear. It took off and landed without any trouble."

The sturdiness of the Moth and its reserve of power would do credit to a much heavier and more expensive ship. Yet its trimness and easy maneuverability are such that it has become a favorite with flying clubs throughout the world. A large portion of the membership of these clubs is made up of newly licensed pilots who find the stability and sportiness of the Moth precisely to their liking.

The flying club movement is progressing rapidly and the Moth's record with similar organizations abroad has made its acceptance here a matter of first choice.

The speed of the Moth is 102 m. p. h., allowing a quick take-off and rapid climb. Equipped with slotted wings it is practically impossible to put the Moth into a spin and it can be landed very slowly.

Price $3,960 Wing Slots $240 Additional

For details of club ownership plan and complete information on the Moth, address Dept. M- 70.

MOTH AIRCRAFT CORPORATION
Division of CURTISS-WRIGHT
27 West 57th Street, New York

The Moth will be on display at the NEW YORK AIRCRAFT SALON, Madison Square Garden—May 3rd to 11th

D.H. *Gipsy* MOTH

(PersonAIRlities continued)

was that he had seen neither the power cable nor the aerial!

After giving the three boys over a hundred hours of flying, the Navy suddenly turned on them and bit them. Here's the sad finish: "The three of us checked out O. K. in seaplanes and went to landplanes. About six weeks later Douglas failed to please two check pilots with his flying, so we lost Doug. Garrison and I stayed on for another six weeks, and then one day there were eight students washed out, and I was one of them. I was sent back to my old ship, the *West Virginia*. Garrison went on a while longer, until one day when taxying down wind he failed to stop when another plane taxied across in front of him. He cut his switch, but the wind was too strong. Result: two planes badly damaged and one Naval officer badly scared. Cliff's next check was a final check in landplanes. He was busted and sent to sea."

But Plummer is only in the Navy until his enlistment runs out, which will be soon. He is flying every chance he gets at C. S. Smith's airport, near Los Angeles He even broke into print last summer. In a forced landing in a pasture he had to ground loop to avoid hitting a cow, thus dishing in a wheel, nosing over, and breaking prop and landing gear.

"Instead of writing, 'Pilot risks life to save dumb animal,' or something like that," Harry complains, "the wretched reporter headed the account, 'Plane Wrecked by Humble Cow.' Why feature the cow, instead of me? Don't you think injustice has been done? As I, and not the cow, really wrecked the plane, do you think that reporter is referring to me?" I don't know. Harry. I haven't seen you fly.

BRYAN H. SHAW, who, the last time I saw him, was demonstrating Avro Avians for Air Associates, started flying in the Royal Air Force in 1921, was posted to Karachi, India, in 1922, and later joined No. 5 Squadron and went to Waziristan on the Northern Frontier. "Spent many happy months bombing natives," he says, the blood-thirsty young man. He enjoyed himself again in 1924 when he joined No. 84 Bombing Squadron in Iraq, which is the new name for Arabia. Here he blew up a lot more natives, to the eternal honor and glory of the great British Empire. After spending two years doing long desert patrols, flying air mail from Basra to Baghdad, and taking natives apart with bombs, Shaw tired of the sport—or ran out of natives—and resigned. Then he went to Canada and joined the Royal Canadian Air Force, but found no natives to blow up. The only natives in Canada were the Indians, and they weren't even worth blowing up. The few remaining alive after years of experience of the white man's whisky and peculiar diseases were quite tame and dying quietly and uncomplainingly on their reservations. Since there seemed no reason to hurry them, Shaw let Nature take its course with them, and came to the States. But a good bombing pilot is wasted in New York. He should go to Chicago and enlist in one of their local wars.



Bryan H. Shaw

SOME time ago I kidded Roy B. Dodson of Kirksville, Mo., and said I couldn't find the town on any map. Now he says: "According to Rand McNally, Kirksville is two miles south of Dodson Airport." And when I asked where Dodson Airport was, he said it was two miles north of Kirksville. Which brings us back where we started from. But he sent me a picture of a field, a hangar and three Eaglerocks, so the place must exist. Last spring when the surface of the airport was very soft a tractor being used to roll it bogged down, the local paper said: "Rolling of the surface of the aviation field was postponed by Roy Dodson when a six-ton roller and Caterpillar tractor belonging to the county lost altitude rapidly over the airport last Friday."



Roy B. Dodson

EARLY BIRDS

JOSEPH BLONDIN has no recollection of his first flight, which according to an old legend in the Blondin family was made on the back of a stork, apparently a bird of poor judgment, for it landed with the infant Joseph on March 4, 1879, in the city of Chicago. That stork was about the last bird to find Chicago; for right after 1879 the place got so smoky, on account of gun fights, that the birds couldn't see to make a landing any nearer to the town than Milwaukee. Even the trains get lost going into Chicago. Back in 1879 they all set out from various cities to find a Union Station in Chicago, but got lost in the smoke and wandered around all over town, setting up stations wherever they ran out of steam. That accounts for the present railroad situation in the windy city—which was the name given it shortly after Big Bill Thompson became mayor. Today, if it wasn't for the Parmalee Transfer Company, no stranger could get from one depot to another; but this old Parmalee, who used to be an Indian Scout accustomed to finding his way about in the woods when forest fires were doing business, got so he could find the stations, though he never has been able to find his way out to the Curtiss company's new flying field. He hunted for that thing for a month, and then died of exhaustion. Shorty Schroeder is the only living man who ever found it, and the search so confused him that he built that plane for the Guggenheim Competition.



Joseph Blondin

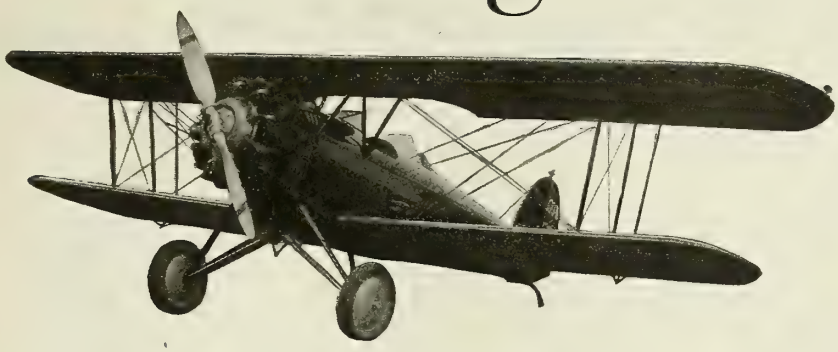
Well, it was this confused city of Chicago, with the world's most mixed up and smoke-obscured system of railroad and air terminals, where Joseph Blondin got his start. Confused by the traffic problem, and vainly seeking a way out, it is not surprising to find him leaping frantically aloft in a balloon as early as 1896. This was in Paris, where his father had taken him to finish his musical studies, for back in Chicago he had taken to playing the violincello as a counter-irritant to the policemen's whistles. And it was that flight which ruined a good violincellist, for in 1897 he returned to America firmly intending to become an aeronaut, as balloonists were called then, until some smart-aleck changed the final syllable from naut to nut.

Joseph discovered that America of 1897 was not air-minded, not even hot-air-minded; for the only aerial activity was the building of a few hot-air and gas balloons in four little factories, all fully mortgaged. So Blondin spent the next few years prospecting for copper, selling art objects in Kansas (where art still finds the going pretty tough) clerking in the Santa Fe offices, back to mining, working as bookkeeper on a daily paper, and playing the violincello to the great annoyance of neighbors. In these hideous affairs the unfortunate Blondin struggled until 1904, when the World's Fair at St. Louis found him playing in an orchestra and watching Knabenshue fly Tom Baldwin's Santos-Dumont type dirigible. He spent his nights playing and his days hanging around the hangar soaking up balloon information, with the sad result that he got bitten anew by the balloon bug and departed for New York and Leo Stevens' balloon factory where he worked on balloons and managed hot-air balloon ascensions every Sunday at Schutzen Park, N. J., where the air-minded spectators would gather after church in the pious hope that they would see a balloonist wafted right to the pearly gates, for even in 1904 the public was attending aeronautical exhibitions in the expectation that something startling and blood-curdling would happen. They were bitterly disappointed when Knabenshue flew right over New York City in his dirigible and never even hit a chimney; everyone felt he'd been cheated.

Blondin busied himself in launching, with others, the parent Aero Club of America, though if he could have forseen what it would eventually amount to as the N. A. A. under Hi Bingham it is doubtful if he would have launched the movement, out of which practically all movement has now evaporated. But Blondin was busy filling up balloons with coal gas at Pittsfield, Mass., erecting a balloon display at Chicago under

(Continued on next page)

. . . a fitting finish



for so fine a ship

Murphy *Airplane Super-Spar* Varnish
used on this Laird custom made biplane

Nothing else but a brilliant, durable varnish would do to bring out, in sparkling beauty, the black fuselage and the gold wings of this custom made Laird Biplane.

Black pigmented dope and gold pigmented dope were used, and over them were sprayed two coats of Murphy Airplane Super-Spar Varnish.

More and more in the airplane field, recognition is being given to *beauty* as a strong selling factor. And quite as important as original beauty is *lasting* beauty, because every ship, wherever it goes, stands as an advertisement of its maker. And the longer the finish stands up, the longer a favorable impression is created.

Murphy Airplane Super-Spar, in addition to giving a remarkably refined finish, has been designed to dry out of dust in 2 to 2½ hours, and to dry tough and hard, ready for recoating, in from 4 to 6 hours. Same day recoating is thus definitely assured.

In spite of this quick dry, Airplane Super-Spar flows very freely and is easy to work, with either brush or spray.

Send to us for any other information you want. Or ask for a demonstration. Or get right to it and order a trial amount through your regular source of supply.

MURPHY VARNISH COMPANY
Newark Chicago San Francisco

ESSEX VARNISH COMPANY, NEWARK
(Associate Company) *Baking Material Specialists*



MURPHY AIRCRAFT FINISHES

Aircraft Spraying Lacquer Colored	"Z-1" Dural Primer Enamel	Aircraft Flexible Finishing Lacquer Clear
Aircraft Super Spar Varnish	Heat Resisting Aluminum Mixing	Aircraft Non-Toxic Nitrate Dope

(PersonAIRlities continued)

great difficulties, and promoting a balloon ascension at Albuquerque, N. M., which is 5,000 feet above sea level. They'd tried ascensions there before, but all had failed because of the altitude. Blondin spent a week filling his balloon with hydrogen gas which he manufactured himself in a crude plant, the main part of which was a leaky water-sprinkler loaned by the city. He finally had to walk the partly-filled bag to the city gas plant, and walk it back to the fair grounds. And even then it only had enough lift to balance sluggishly, but not to rise. It looked like a flop, until the sun came out and heated the gas sufficiently to enable Blondin to soar aloft with twenty pounds of sand ballast. Off he went, and thus describes Albuquerque's first successful flight: "I knew I was traveling on Caloric alone, and the shadow of a cloud on my balloon might rob me of that any minute. Then, a native rancher over whose place I was slowly drifting, ran into his house and instantly reappeared with a rifle, which barked and spat a ring of smoke straight up at me. My precious twenty pounds of ballast on which I had been counting for a safe landing had to be dropped then and there. The entire voyage extended only eighteen miles up the Rio Grande Valley, but this short jump was punctuated by eight attempts at murder. I don't blame those natives; they never before had seen a balloon and possibly had never heard of one. Their perfectly natural reaction against the unknown was to consider it an enemy. Sunset brought my balloon down with a rush, to a landing over which I had no control and no defense, except the good fortune of a flat unobstructed mesa-land to receive us, and the resiliency of the basket into which I was shaken from the load ring, on to which I had hoisted myself to lessen the shock. A few more strides through the air and we were down, finally, without any damage to myself or the basket. By the time I had deflated the bag some of my erstwhile would-be assassins drove up, very excited, and somewhat abashed to find a man already in charge of the animal they probably thought they had shot down. They were very friendly now and assisted me to get back to Albuquerque, to drive the last few blocks to a most exciting and enthusiastic reception."

Blondin spent the next few years ballooning to fame, and in 1909 returned to Albuquerque, where he carried hundreds of passengers on captive ascensions, and was congratulated by President Taft. Then Blondin made a free-flight over the Sandia Range, 10,000 feet, carrying a passenger, Roy Stamm. He made ninety miles in three hours and took three days to drive back.

In 1910 Blondin joined Glenn H. Curtiss at the Los Angeles meet and saw that the airplane would make progress that the balloon could not. "This meet," he concludes, "placed the heavier-than-air so squarely in the limelight; in fact, backed the lighter-than-air so completely off stage, that I had to bow before the inevitable and turn to the development of airplane design and construction as the sole remaining means of continuing to identify myself with the air clan. The year 1910, therefore, marks the end of my Early Bird career."

Blondin turned his talents to invention with such success that he patented many things, including the differential aileron and elevator controls, which he sold to Colonel Fleet of Consolidated Aircraft. This invention is today endorsed as a superior means of lateral control, particularly at the stalling point. At present Mr. Blondin is financing construction of the Blondin Mallard, which he claims to be "a really safe, fool-proof, inherently-stable, commercial type ship." I kind of doubt that "fool-proof" part; they haven't even made a fool-proof automobile yet. An airplane is no safer than its weakest nut, and sometimes that nut is right behind the joy-stick.

JACK VILAS holds a number of "firsts," the most important of which is that he is probably the first person in the world to conceive and carry out successfully the idea of locating forest fires by airplane, which he did at Trout Lake, Wisconsin, when he flew for the Wisconsin State Forestry Department in 1915. Then, he was the first ever to locate a dead body in Lake Michigan and tow it to shore behind an airplane. (He writes that himself, but neglects details; but I am presuming that he was taxying when he towed the corpse, which was evidently that of someone a gangster hadn't liked.) He flew the first flying boat in New York City, the first flying boat seen in Chicago, and the first one in Canada—and if anyone thinks Jack wasn't the first, let me know. That was in 1913, in which year he flew from St. Joe, Michigan, to Chicago, a distance of sixty-three miles which he made in 100 minutes. He must have been flying with the brakes on. Anyhow, that was the first flight across Lake Michigan. He flew on the St. Lawrence River and around Chicago until 1917, when he joined the Navy and was stationed at Great Lakes. This duty with the Navy must have discouraged him, for he has not been actively connected with flying since then.

His first flight in an airplane was with Max Lilley in a Wright Model B at Cicero Field, Chicago in the fall of 1912. In April 1913 he enrolled in the Curtiss Flying School at Hammondsport and was instructed by Doc Wildeman, Becky Havens, and Lannie Callan, after which he bought his own boat, an early Curtiss later developed into the famous Model F. In June 1913, he passed his license test and received Hydro License No. 6, Aero Club of America.

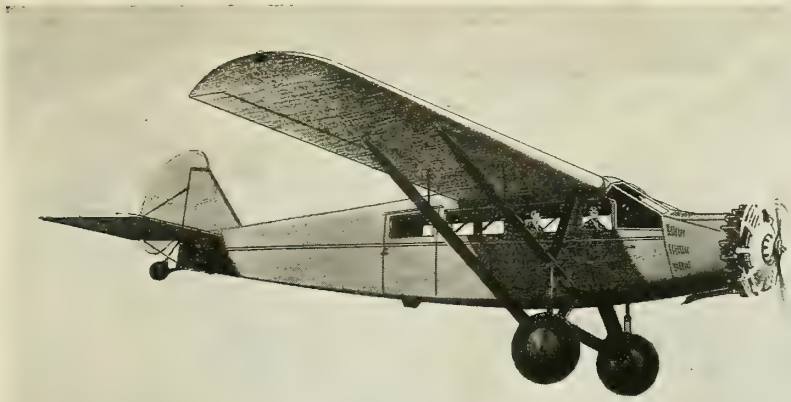


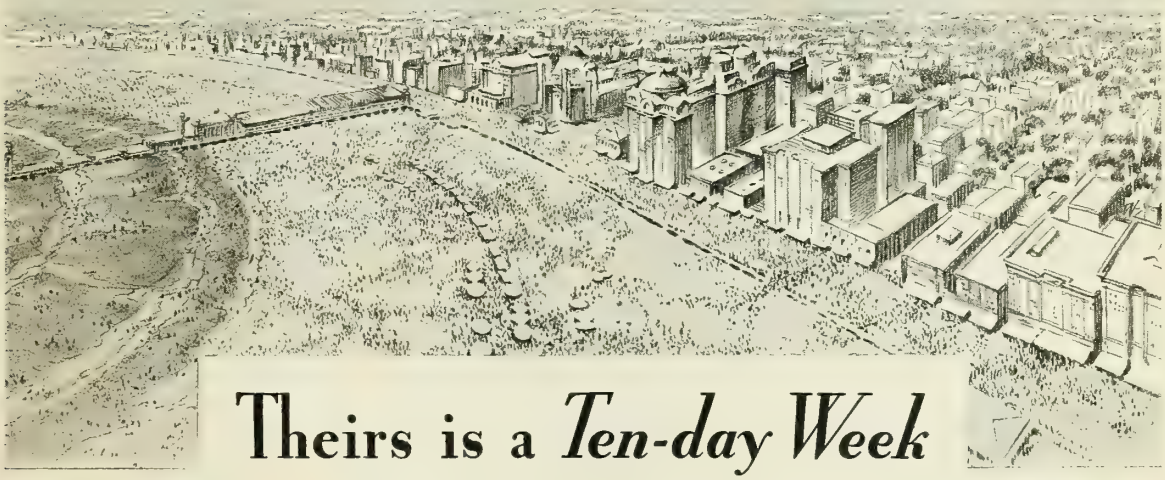
Percy Moel and Jack Vilas

MAJOR G. E. BROWER didn't wait for an engine before he started flying; he simply got into a glider, or on a glider, back in 1910, and took off. That was when he was president of the Boy's High School Aero Club, in Brooklyn, N. Y., a town which has done much for the early Broadway vaudeville jokes, the first one of which went: "This is my last appearance in civilization; tomorrow I play Brooklyn." That one still gets a laugh in New York. And in Brooklyn the hard-working ham pulls it again and says, "My next appearance is in Flushing." And gets another laugh. Which proves that civic pride is a peculiar growth. Every town has some smaller town to laugh at. Though what town a place like Farmingdale can pick on is a mystery known only to Dick Depew, who recently startled us all and upset our calculations by getting married. Dick proved conclusively that nobody is safe.

But we were speaking of Major Brower and his early daring, which he continued at Cornell from 1911 to 1916. He glid in anything that glode, and to such effect that he became president of the Cornell Aero Club. In 1915-16 he became draftsman, sales engineer and branch manager of Thomas Brothers' Flying School, and in 1916 was commissioned in the Army (Field Artillery), applying immediately for detail to Aviation Section of the Signal Corps. But the war started, so they figured he'd better stick with the Field Artillery and see if he could hit anything. But in France he managed to get assigned as aerial observer in September 1918, where he observed and flew with the First Aero Squadron, getting what dual he could, as he had been doing off and on since 1914. While on leave in England in June 1919, he went solo at Houslow and thereafter continued flying; was operations officer, First Day Bombardment Group at Kelly Field in 1920; secretary and student, Air Service Tactical School, 1921; post-graduate course Massachusetts Institute of Technology, Aero-Engineering, 1927; and Chief, Airplane Branch, Materiel Division, Air Corps, 1923 to present.

ENTHUSIASTIC report from a student of the noble art, as contained in a recent letter. "I have five hours flying time now and I hope to be an instructor. I am putting my heart and sole into flying."





Theirs is a *Ten-day Week*

THE five-day week may be the thing for labor, but what most executives need today is a ten-day week. A conference in Toronto, an appointment in Wheeling, W. Va., the weekly meeting of the factory committee in Evansville, Ind., a three-day trade convention at Atlantic City. Now it can be done, easily, comfortably, in one week—the new Travel Air ten-day week for major executives.

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AIRPORT AND AIRWAY

News of airlines, airports, and airways; radio, lighting and other auxiliary services

By

Kent Sagendorph

The Gasoline Tax

SHOULD an interstate air transport company pay a local tax on gasoline? Several States, having voted themselves the privilege of collecting it, say yes! Air transport companies say no! Recently this question has emerged from a purely sectional discussion to command national attention, both from the industry and from the States. This question of State gasoline taxes on aviation fuel is a sort of test case, to decide the whole question of the right of a State or local government to regulate and tax an interstate airline.

The matter came to light when the Boeing Air Transport company's legal department filed a petition for an injunction in Lincoln, Nebraska, against certain State officials who were collecting a four-cent gasoline tax on every gallon of fuel poured into the tanks of Boeing mail ships at Nebraska airports. Boeing paid, but under protest. Wyoming's State tax of four cents a gallon was likewise questioned by a Boeing injunction. Two other States found themselves on the defensive in the same manner. Then the Phillips Petroleum Company, of Bartlesville, Oklahoma, raised the matter to national prominence by a series of telegrams to governors of States crossed by airlines, calling on each governor for a statement in explanation of the tax.

The question resolves itself to this: Boeing claims that an attempt to collect a State tax is a violation of Article 1, Section 7, of the United States Constitution, which says that all revenue bills must originate in the House of Representatives. The company further deposes and says that this gasoline was purchased from the Phillips company and shipped to Boeing airports in tank cars, and that therefore it is private property and the State cannot regulate or tax the same. Boeing did not claim exemption for the tax on fuel used in its trucks or for purely local airplane traffic. The fuel used for interstate work, however, was carefully noted and a refund asked for the tax paid on this amount. Nebraska and Wyoming refused.

Translating the legal phraseology, we note that Boeing claims this State tax to be an attempt to regulate interstate commerce, also a constitutional violation; also that it deprives the company of property without due process of law, and that it is not an "excise" tax and therefore is unconstitutional, illegal and null and void.

The State of Nebraska replied with a court action to cancel Boeing's license to deal in gasoline at its own airports, and another suit to compel the company to pay the tax. The law, said the officials, does not make a distinction between interstate gasoline and any other kind of gasoline. It reported that all the other common carriers engaged in interstate traffic, such as railroads, bus lines and so forth, paid their tax and did not ask for a refund. The governor of Wyoming stated that the tax was "wise and constructive in character" and that the State would probably use the tax to improve and maintain municipal airports. No guarantee was given, however.

California came out in the open and offered a compromise. The Golden State is now refunding gasoline tax to the aviation industry at the rate of $60,000 a year, and Mr. B. B. Meek, Director of Public Works, replied to Mr. Phillips' telegram by inviting the aviation industry to confer with him about what they wanted. He suggested that the State spend the whole amount of the tax on intermediate fields and air navigation aids.

This satisfied Boeing and Mr. Phillips, who see that expenditures of this kind are necessary and for the good of the whole industry. But Wyoming and Nebraska continue to clutch the tax, fight Boeing in the courts and threaten all sorts of dire things. Nobody can blame Boeing for being ruffled at a four-cent tax, which costs it, in Nebraska alone, $842 a month. No evidences are visible that the State is giving Boeing anything for this money. On the contrary, avers the complaint, it is used to pay the salaries of motorcycle cops on the State roads and other non-aeronautical activities. Boeing pays a healthy property tax, and also four cents a gallon for its automobile and local flying fuel. If it has to pay this amount in all the seven States crossed by its transcontinental mail line, some guarantee should be given that these thousands of dollars are being used in the cause of aviation, not to feed the old pork barrel.



Chicago ticket office of the Boeing System and Stout Air Lines

Federation Plans Thirty Airports

ONE of the most comprehensive surveys of regional airport needs ever undertaken was finished recently in Philadelphia, Pa., by the Regional Planning Federation, representing a tri-State district composed of parts of Pennsylvania, New Jersey and Delaware. Major Samuel B. Eckert, chairman of the board's aviation division, has drawn a plan for thirty airports to be constructed in the district, each to have its special sort of aviation activity and the whole group so located that the aviation needs of the community will be solved scientifically.

The key position is to be Hog Island, the war-time shipyard recently sold by the Government for the site of a huge air transport field. With this location as the concentrating point of all transportation activities, the other fields will be used for schools, flying clubs, air mail bases and military airports, the report states. The proposals include:

An airport near Princeton, to serve the university.

Mercer Airport, Trenton, to become a transport airport exclusively.

An auxiliary field at South Langhorne, Pa., and another on the airway ten miles south.

Other auxiliary fields along the Delaware River near Gibbstown and Penngrove.

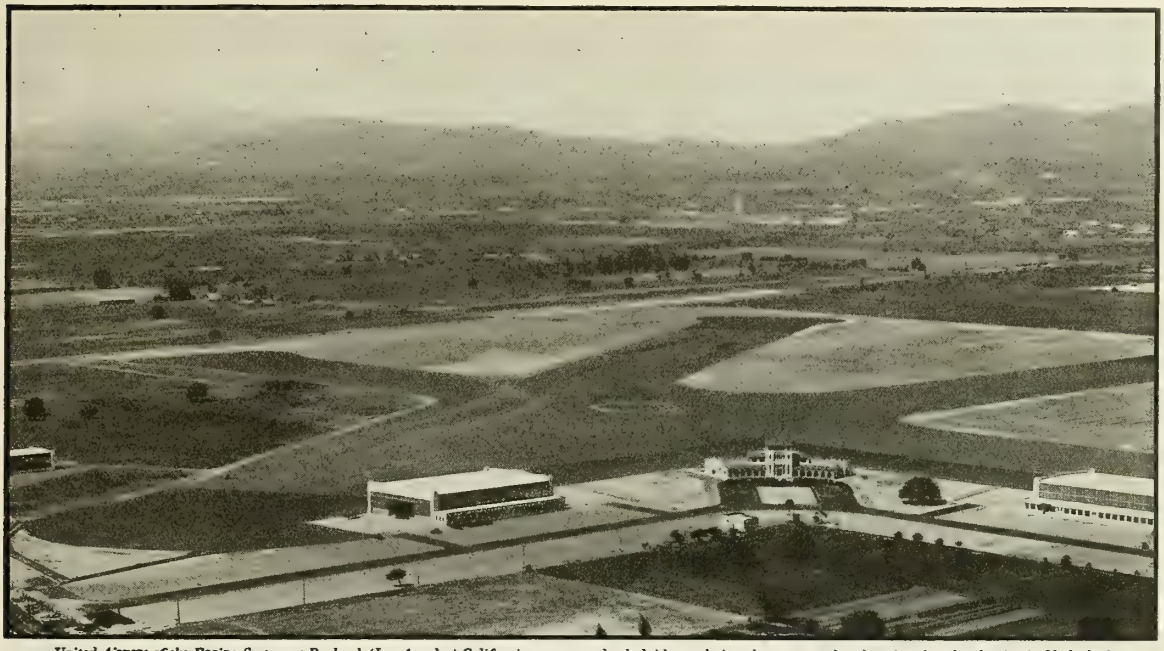
A major airport at Wilmington, Del., with accommodation for seaplanes.

Existing fields along the Philadelphia-Pittsburgh airway to be developed further.

Auxiliary fields near Ambler and Lansdale, and an aerial base near the Perkasie-Sellersville area along a proposed route to Syracuse and Buffalo.

A service base in the vicinity of Hammonton, and one near Bridgeton, N. J.

(Continued on next page)



United Airport of the Boeing System at Burbank (Los Angeles) California . . . completely laid out, designed, constructed and equipped under the Austin Method of Undivided Responsibility . . . one of many Austin aeronautical projects in 22 states and 38 cities in the United States and Canada.

AIRPORTS OF TODAY

. . . with facilities for tomorrow

IT has been generally recognized that the design and construction of a modern airport must embody the principles of maximum safety . . . that return on the investment, future expansion, convenience of location and similar factors must be carefully considered.

And now Austin, pioneer airport designers and builders, brings another factor into prominence by furnishing facilities to provide for maximum convenience for passengers, as well as speedy, economical handling of traffic.

In designing, constructing and equipping the United Airport of the Boeing System at Burbank, California, Austin not only exhibited its ability to create an efficient air terminal, but also added the features that make this a port of today . . . with facilities for tomorrow. There is an up-to-date depot with restful waiting rooms . . . a promenade from which guests may watch activities . . . modern passenger loading.

Austin Engineers, experienced and capable, also concentrated their efforts in planning the runways, the lighting, the hangars, etc. The result is obvious to all who have inspected the United Airport . . . on land or from the sky. It is thoroughly efficient, modern and safe.

To those with aeronautical programs . . . . whether they involve complete ports, individual hangars, or perhaps an aircraft manufacturing plant . . . . Austin offers sound counsel and advanced engineering ideas. Wire, phone, write or use the convenient memo below.

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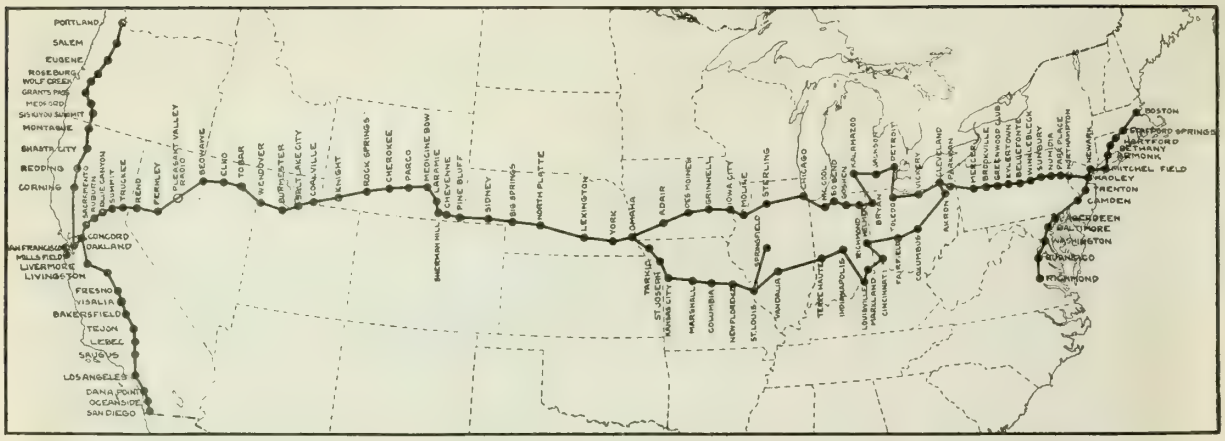
Airport Engineers and Builders ✈ Cleveland

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with ..... ft. clearance. ☐ Factory approx. ..... sq. ft. Send copy of "Airports and Aviation Buildings." Name .....
Position ..... Firm ..... City ..... AD 5-30



Map showing the arrangement of Department of Commerce teletype system for collecting hourly weather reports

(*Continued from preceding page*)

An auxiliary field near Mullica Hill, N. J.

Local airports for Chester and Kennett Square.

A service base near Phoenixville and improvement of facilities at Pottstown.

Auxiliary fields at Chadd's Ford, Elverson, Birdsboro and Greenland.

More local airports along the New Jersey shore of the Delaware River to care for future traffic. Suggested are bases at Burlington, Bordentown, Mt. Holly, Medford, Woodbury and Glassboro, or nearby.

Routes linking the principal cities in the tri-State district with Atlantic City, Bethlehem, Scranton, Syracuse and Buffalo.

A route extending along the New Jersey coast joining the larger summer resorts.

Two new routes extending across southern New Jersey; one from Camden to Atlantic City and the other directly south, over Bridgeton.

The report points out that the tri-State region is full of sites admirably suited to airport construction, and that certain areas should be reserved for construction of these airports and auxiliary fields as air traffic demands make them necessary. It urges all cities and towns in the district to mark their roofs for the guidance of pilots, and offers aid to local communities which are trying to promote airport policy for their community.

The main feature of the program is the prediction by Major Eckert that in the future, airports will serve but one specialized purpose instead of trying to answer the many needs of aviation at one field. The report terms such a field a "five-ring circus," and perhaps the reader will agree that sometimes the resemblance is more marked than the Major intended, possibly. At big fields, like Roosevelt or Newark for instance, in full operation, we see a big transport ship coming in from one direction, a heavy mail plane taxying in another, and a hetrogeneous collection of test flights, student solo hops, charter trips and five-dollars-a-ride tourist planes all buzzing around each other at the same time. The Tri-State Regional Planning Federation is trying to avoid this condition in its area and confine certain activities to certain types of airports, which will be equipped solely for that purpose.

This report was prepared in collaboration with Col. Harry H. Blee, of the Aeronautics Branch, Department of Commerce, and the man who is charged with the responsibility of airport development. It represents, therefore, the last word in large-scale airport projects. If the many local communities involved will work in harmony with the Regional Planning Federation and the Department of Commerce, the future will see a carefully-organized group of airports which will serve the aviation needs of the district efficiently and without confusion.

Michigan's Air Code Unpopular

SINCE we have discussed a few other States and their relation to the air transport industry, we must not neglect Michigan. At the recent session of the legislature a bill was passed, and signed by the governor, controlling all flight activities within the borders of the State and appointing a State Board of Aeronautics to decide how to carry out the program. Everything was serene for a few months. Now, however, certain air transport and aeronautical organizations within the State are not completely satisfied with the unlimited authority given the board by the provisions of the bill, and have called on the governor to abolish the code entirely. It has not been enforced since it went into effect, but the pilots' organization fears the day when it will be, and is taking steps accordingly.

The organization, called The Aircrafters, is headed by Pete Goff, veteran flier. At a recent meeting in Detroit, Capt. Ray Collins, State Director of Aeronautics, explained the provisions of the new code to about fifty pilots who were present. Immeditely following his remarks, the pilots went into conference and endorsed a resolution calling on Governor Fred W. Green to abolish the code entirely.

Most strenuously opposed were the rules prohibiting licensed pilots from landing anywhere but on a licensed airport; restricting private pilots to two passengers, requiring schools to have one ship for every fifteen students enrolled and compelling private pilots to complete their courses within four months of enrollment.

There are good reasons for and against some of these stipulations. The one about a licensed pilot being forbidden to land anywhere but on a licensed airport is, I believe, unfair to charter services. If a customer dashed up to your hangar in a hurry and asked to be flown to Yapville or some other place, it would be unfortunate to turn down cash business because Yapville had no licensed airport. If a charter pilot looks over some farmer's cow pasture and decides he can land there, he usually can. A good pilot can take an aerial photographer, for instance, to a given point and unfailingly pick out a good field and sit down in it. Why should the State deny him this privilege?

Of course, a private pilot should restrain his desire to fly twelve-passenger trimotors, and no flying school should attempt to teach a hundred students with one ship. It will be remembered, however, that the Department of Commerce looks after such things also; but its regulations apply only to interstate flying, of course. Members of the State board, upon being interviewed, have said that they favored modification of some of the more extreme demands, and agreed to the appointment of at least one airman to the board—which has none at present.

AIRPORT AND AIRWAY DEVELOPMENTS

Second A-1-A Rating Issued to Denver Airport

ANOTHER A-1-A airport joined the ranks of those rated by the Department of Commerce, raising the total to two. Denver Municipal Airport, unofficially considered as one of the best equipped fields in the country, was awarded the highest type rating within the Department's power after its representatives had examined the long runways, new hangars and service facilities. The field is owned and operated by the City of Denver.

The city and the airport are situated at an elevation of approximately 5,000 feet above sea level. For this reason the runways are slightly longer than those of most Eastern and Middle Western fields. Details of the new airport have not been made public by the Department, but will be available in the near future.

(*Continued on next page*)

Announcing national distribution for
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To all users and prospective users of the Packard Aircraft Diesel Engine

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(*Continued from preceding page*)

Work Begins on New Airway

THE Department of Commerce announces that work is to begin immediately on a new airway between St. Louis and New York City. A survey of the route has been completed, and the installation of five radio range beacons, twelve intermediate landing fields and fifty beacon lights has been approved.

Only two sections of the route will involve new construction, the balance being in operation at the present time. One of these new sections will begin at St. Louis and extend 233 miles to Indianapolis, via Terre Haute, Indiana. The other starts at Columbus and extends 412 miles to Philadelphia, via Pittsburgh and Harrisburg. From Indianapolis to Columbus, and Philadelphia to New York, the route follows existing airways. When the route is completed, there will be a through line from St. Louis to New York, serving major intermediate points and enabling connections to be made for the West and Southwest. The State of Pennsylvania will pay the cost of conditioning the three intermediate fields between Pittsburgh and Philadelphia, which are at Williamsburgh, Newton-Hamilton and Blain.

Notices to Pilots

NEW BEACON: Westfield Airport, Westfield, N. J. Department of Commerce has installed a revolving beacon and lighted wind cone here. In operation sunset to sunrise.

Air Markers: (1) Pottsville, Penna. Name of town placed by Kiwanis Club on Lawton's hill within the city limits; crushed slag rolled into the sod and sprayed with concrete. Total length 500 feet; letters fifty feet high.

(2) Newark: name of city, meridian indicator and directional arrow painted on the top of large gas holder near central part of city. The Public Service Company of New Jersey has completed seven of these markers, the others being at Caldwell, Dumont, Somerville, Metuchen, Trenton and Camden. All are painted in chrome yellow and have been approved by the Department of Commerce.

Seaplane Refueling Barge: Charleston, S. C. Placed in the harbor off the Battery by the Standard Oil Company of New Jersey on March 22nd. Name painted fore and aft: STANAVO 1, and company insignia painted on shed roof, easily seen by pilots. Wind cone is provided, as well as special poles to keep wings clear while plane is being fueled. Benches for passengers and small rest room for pilots are provided. Pilots have choice of two fuels and several different grades of oil. A small power launch is available to bring passengers ashore.

Eastern Air Transport Base Moved to Atlanta, Georgia

REPAIR DEPOT and operations center of Eastern Air Transport's Atlantic coast air mail line have been moved from Richmond, Va., to Atlanta, Ga. All supplies and personnel were likewise transferred, and C. H. Dolan was placed in charge of the new division headquarters.

A new hangar, 120 by 120 feet, has been opened for company business, with an extension along one side containing operations offices, repair department and stockroom. The original Eastern Air Transport hangar has been taken over by Curtiss-Wright Flying Service. Space is available in both hangars for transient planes.

Test of Hangar Sprinkler Systems

IN Washington, D. C., recently gathered a number of airport engineers, insurance underwriters and Department of Commerce officials to attend a series of tests of new sprinkler systems for airplane hangars. The tests, sponsored by the National Board of Fire Underwriters, involved a newly-constructed hangar, about twenty airplanes and close to a dozen makes of sprinklers for fire protection purposes.

The hangar was filled with airplanes and equipment to represent as nearly as possible all the conditions found in the average small airport hangar. Three sources of fire were considered: from some source outside of the plane, fire starting in the plane, and fire in a pool of gasoline under the floor of the plane. Sprinklers were then brought into action, and the efficiency of the various types compared. Reports of the tests may be obtained by writing Col. Harry H. Blee, Department of Commerce, Washington, D. C.

For some time there has been some objection to sprinklers in airplane hangars because of their alleged uselessness against gasoline fires. Colonel Blee's "Fact-Finding Committee" was composed of representatives of the Aeronautics Branch and the Aeronautical Chamber of Commerce, both of which organizations had objected to the code dealing with automatic sprinklers. These tests were made in order to arrive at a satisfactory basis for drafting the code, and proved to be surprising; not only because of the way the sprinklers handled the gasoline fires, but also because they proved that the committee's understanding of the sprinkler system was erroneous. For certain reasons, the findings were not made public. But anyone contemplating the erection of a hangar and desirous of learning the value of sprinkler protection may study the results of these tests by writing Colonel Blee.



Seaplane refueling barge of Standard Oil of New Jersey at Charleston, S. C.

Should Airports Be Zoned?

BECAUSE of hazards which might be present in the vicinity of airports, the question of zoning was brought up recently in Washington and debated before Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. He authorized a committee to study the situation and report its findings to him.

The object in zoning the vicinity of an airport is as follows: The flying public should be insured against hazard in the vicinity of airports, such as tall chimneys, high-tension wires and other obstructions which are preventable and which will be prevented in the future if the zoning plan is adopted. The thousands of dollars spent in providing modern airports should not be jeopardized by some foolhardy development in the neighborhood which might be a menace to aircraft operations, contends Colonel Young. At the same time, he continues, the non-flying public should be protected from hazards due to the flying activity at and near an airport.

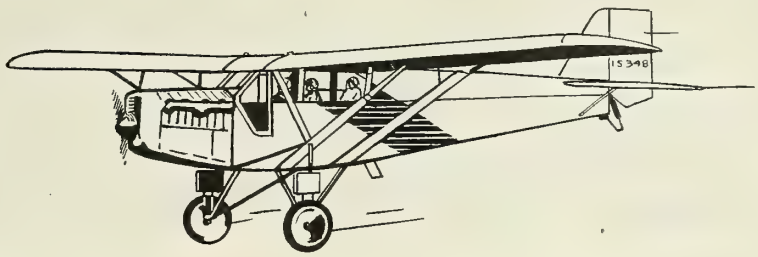
This will probably result in a series of recommendations which will define the sort of activities which may be carried on near an airport. The Aeronautics Branch will go a step farther and tell the airport managers what they may and may not do in the neighborhood of a flying field.

This zoning plan sounds complicated, but in reality it is simple and might prove effective. For instance, property in parts of Mineola, Long Island, depreciated in value because of the incessant noise of planes flying over the housetops on test flights and other purely local business. This might as well be carried on over some other portion of Long Island where the noise would be less offensive. Also, if an enterprising electric light company wants to run a 40,000-volt transmission line on the edges of an airport where some passenger plane might become entangled in it, the Department will protest; gently but firmly. In such ways as these the Aeronautics Branch foresees coming conditions and prepares for them in advance. Recommendations in the matter of airport zoning should be addressed to Col. Harry H. Blee, Department of Commerce, Washington.

(*Continued on next page*)

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IN A USED PLANE GUARANTEED BY CURTISS-WRIGHT FLYING SERVICE



CURTISS-WRIGHT now makes it possible for every pilot to own his own plane at a small outlay—first, by reducing prices on good used planes to drastic low levels; second, by selling them on easy, deferred payments. This policy is now enabling pilots all over the country to build up flying time economically and conveniently. Many new owners are paying for their planes out of profits from local hopping, charter service and student instruction. Flying clubs too, are extending their activities with low-priced equipment, fully guaranteed.

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Big Bargains—Easy Terms

At the 40 Curtiss-Wright bases, planes used in selected operations and sales demonstrations are listed at far below factory cost. All are guaranteed airworthy, all A. T. C., in splendid condition and perfect repair, ready for you to fly away. A few are listed here. There are many others to meet your needs and your pocketbook. See and compare Curtiss-Wright Used Planes values. Investigate the liberal Curtiss-Wright payment plan. Full description, with quotations, of 'on hand' stock will be gladly furnished. Write or wire the base nearest you.

ROBIN—3-place Cabin type, OX Engine, D. C. No. C262E, 90 hours, base Chicago	$1,800
ROBIN—3-place Cabin type, OX Engine, D. C. No. NC171E, 58 hours, base Louisville	1,975
ROBIN—3-place Cabin type, OX Engine, D. C. No. C9209, 93 hours, base Raleigh, N. C.	1,785
ROBIN—3-place Cabin type, Challenger Engine, D. C. No. NC9276, 151 hours, base Baltimore	4,650
ROBIN—3-place Cabin type, Challenger Engine, D. C. No. NC372K, 179 hours, base Denver	4,500
ROBIN—3-place Cabin type, Challenger Engine, D. C. No. NC9294, 170 hours, base Boston	4,550
CESSNA—4-place Cabin type, 300 Whirlwind Engine, D. C. No. NC301M, 15 hours, base Miami	7,850
CESSNA—4-place Cabin type, 225 Whirlwind Engine, D. C. No. NC6444, 13 hours, base Los Angeles	5,785
CESSNA — 4-place Cabin type, Warner Engine, D. C. No. NC8792, 96 hours, base Oklahoma City	3,540
COMMANDAIRE—2-place Op. Biplane (Trainer), OX Engine, D. C. No. NC584E, 5 hours, base Bridgeport, Conn.	1,775
COMMANDAIRE — 3-place Op. Biplane, Warner Engine, D. C. No. NC608E, 57 hours, base Caldwell, N. J.	3,585
COMMANDAIRE—3-place Op. Biplane, 165 Whirlwind Engine, D. C. No. NC977E, 44 hours, base Kansas City	4,280

2 PLACE COMMANDAIRE $1775 BIPLANE

USED PLANE DIVISION

CURTISS-WRIGHT FLYING SERVICE

27 West 57th Street New York City, N. Y.

ATLANTA . . . . . GEORGIA	LOS ANGELES . . CALIFORNIA
BALTIMORE . . . MARYLAND	LOUISVILLE . . . KENTUCKY
BOSTON . . MASSACHUSETTS	MEMPHIS . . . . TENNESSEE
BRIDGEPORT . CONNECTICUT	MIAMI . . . . . FLORIDA
BUFFALO . . . . NEW YORK	MILWAUKEE . . . WISCONSIN
CALDWELL . . NEW JERSEY	MOLINE . . . . . ILLINOIS
CHICAGO . . . . . ILLINOIS	NEW YORK . . . NEW YORK
CLEVELAND . . . . . OHIO	NORTH BEACH, LONG ISLAND
COLUMBIA, SOUTH CAROLINA	OKLAHOMA CITY, OKLAHOMA
COLUMBUS . . . . . OHIO	PITTSBURGH, PENNSYLVANIA
DALLAS . . . . . TEXAS	PORTLAND . . . . MAINE
DENVER . . . . . COLORADO	RALEIGH, NORTH CAROLINA
DETROIT . . . . . MICHIGAN	ROCKLAND . . . . MAINE
HARTFORD . . CONNECTICUT	ST. LOUIS . . . . MISSOURI
HOUSTON . . . . . TEXAS	SAN FRANCISCO, CALIFORNIA
INDIANAPOLIS . . . INDIANA	TOLEDO . . . . . OHIO
KANSAS CITY . . . KANSAS	VALLEY STREAM, NEW YORK

(*Continued from preceding page*)

W.A.E. Airport Dedicated at Los Angeles

AMID a three-day celebration, featuring a free aircraft and accessory exhibit, a military band and other entertainment, the million-dollar Western Air Express terminal on Valley Boulevard, Los Angeles, was dedicated with formalities and ceremony. The program of events reads more like an outdoor circus than a serious aeronautical event, but judging from the number of persons who visited the scene, it was a success.

No admission either to the field or to the aircraft exhibit was charged the thousands of visitors. The opening address was delivered by Governor C. C. Young; special events were staged on "School Day" for the benefit of Los Angeles children who were escorted to the field by their teachers and parents. Two Fokker F-32 quadruple-engined airliners were present for exhibition and were inspected by the curious throngs.

Fifth Fire Damages Newark Airport

WHEN five fires occur at the same place on an airport in two weeks, the owner of the damaged property may be pardoned for thinking he has enemies. At Newark Airport four of them were discovered in time to prevent a serious loss, and investigators were assigned to discover the cause. They failed to explain the mysterious origin of the blazes. Then a fifth fire burst out without warning and left a $40,000 property damage in its wake.

Flames were discovered by Otto Faber, an eighteen-year-old mechanic employed by the Newark Air Service in its hangar at Newark Airport. He rushed to the front of the building and gave the alarm; occupants of other hangars attempted to stem the blaze with hand extinguishers and a hurry call was put through to the Newark fire department. When the city fire apparatus arrived a few minutes later the field and its approaches were blocked solidly with a long line of cars belonging to curious sightseers, and the siren of the red trucks screamed in vain.

As the apparatus finally pushed through to the burning hangar, portions of the wooden roof gave way and fell into the blazing interior. Ground crews and pilots had dragged two airplanes clear; one of which was owned by Mrs. Opal Kunz, president of the "Ninety-nines," an organization of women pilots. The firemen could only prevent the fire from spreading, and the blaze burned itself out, leaving a charred and twisted steel skeleton of the hangar and a few bits of what had been a new airplane a few hours before.

Lieut. Richard Aldrich, manager of the airport, stated that he believed the fire to be of incendiary origin. Both the airport officials and the Newark police have launched investigations.

Birmingham to Have New Port

BY a vote of two and a half to one, the voters of Birmingham, Alabama, passed a million dollar bond issue for the establishment of a new modern airport near the city. Bids for the construction of hangars, runways and shops and installation of lighting equipment will be asked in the near future.

DuPont's Private Airport

BELIN DuPONT, prominent member of the Delaware DuPonts, millionaire explosive, rayon and lacquer manufacturing family, has announced that his private airport is nearly completed on a portion of his estate five miles from the city of Wilmington, Del. It will be operated as a private venture for himself and members of the DuPont organization flying to Wilmington on company business, he informs us.

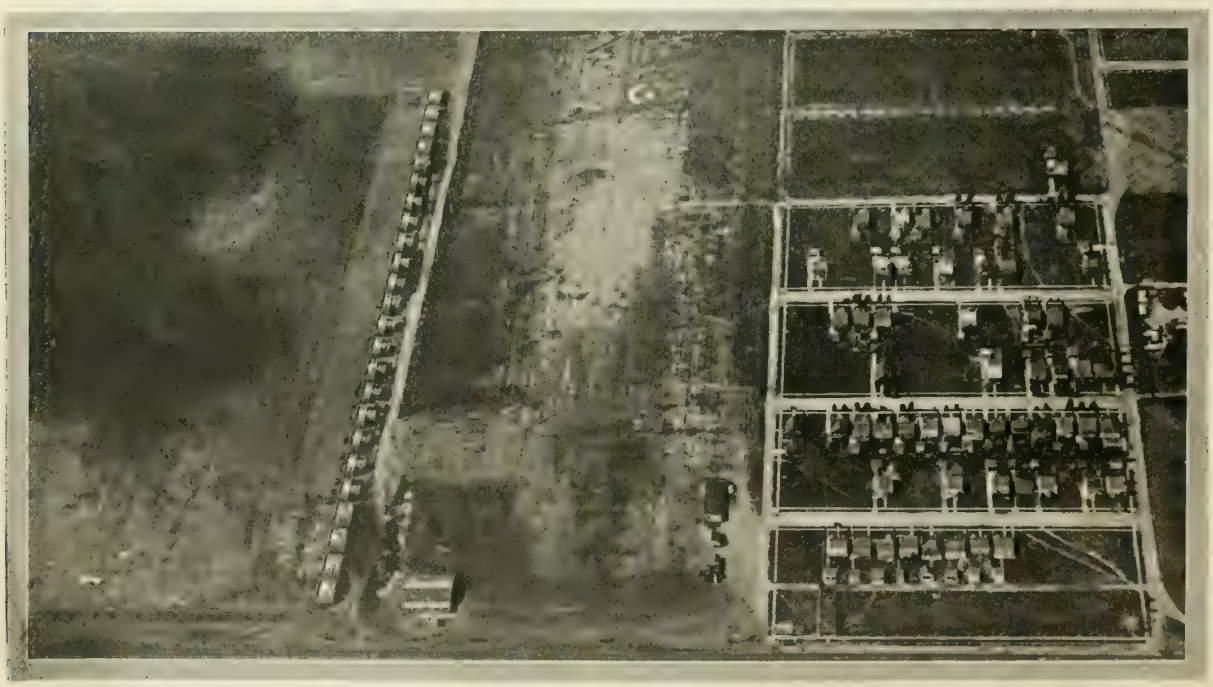
The landing area contains slightly more than forty acres. Two hangars have been erected, and also an administration building completely equipped with every modern convenience. A private meteorological station will be maintained, including an anemometer to give the wind velocity. A remote control system controls the floodlights and the revolving beacon on the roof of one hangar. A small sized Neon beacon is installed on the roof of the adjoining hangar. A full staff of mechanics and attendants will be on hand to receive any of the numerous fleet of DuPont planes. The field will not be open to the public.

The undertaking shows that the DuPont company has realized that a great industrial organization should have adequate airport facilities as well as docks, railroad sidings or good road approaches. Other firms are beginning to see the advantages of private airports, and perhaps by next year this phase of airport design will become recognized as an established aid to firms which keep their fleets of planes in the air on business for the company, such as transportation of executives to outlying branches, salesmen coming in for conferences and other industrial and merchandising activities.

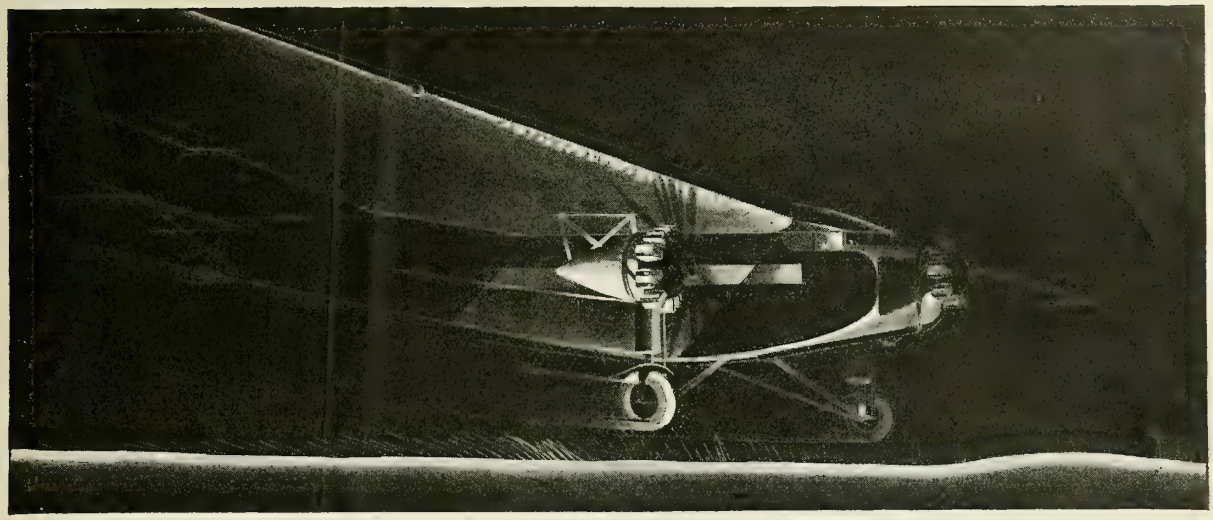
More Airway Beacons Added

THERE are now approximately 1,450 airway beacons in operation every night in the United States, of which all but 125 are owned and operated by the Government, says Col. Clarence M. Young, of the De-

(*Continued on next page*)



Airport of the Aero Corporation of California at Los Angeles. Star and crescent insignia indicates the part of the field used by the Crescent company which does aerial photographic work.



1,027 TAKE-OFFS · 1,027 LANDINGS

YOU can visualize the high speed necessary for a quick take-off, the strain under a heavy load, the hard, bouncing blows of a fast landing, the jerking and pulling of unyielding brakes.

Picture small, rough, soft landing fields that required almost a constant use of brakes.

Then picture these conditions in terms of more than 6 months of continuous hard flying in weather that was often very rough and uncertain.

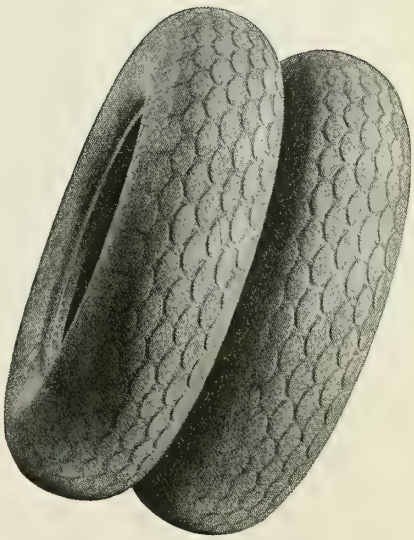
Think of the tires—bearing the burden of the load, following an uncharted course along the ground in the run for flying speed, bumping down on a rough field to find a safe landing.

Still you have but a general idea of what was encountered by the Universal Flyers, Washington, D. C., in their recent educational tour of the country.

In a Ford Tri-Motored Monoplane, equipped with 40 x 10 Goodrich Airplane Tires, these men actually took off 1,027 times and made 1,027 landings.

Notice the tires pictured here—sturdy, no breaks in the carcass, a definite, sharp non-skid design still remaining. These are the original Silvertowns that lasted throughout the entire trip and performed in a manner necessary to make the tour successful.

No wonder pilots have such confidence in Goodrich Silvertowns—no wonder they are the first choice of airplane manufacturers.



Look at these Tires!

These 40 x 10 Goodrich Airplane Tires, on a Ford Tri-Motored Monoplane, actually made 1,027 take-offs, 1,027 landings, and still look fit for more service.

■

THE B. F. GOODRICH RUBBER COMPANY, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Company, Los Angeles, Calif. In Canada: Canadian Goodrich Company, Kitchener, Ontario.

Goodrich RUBBER FOR AIRPLANES



Types of planes flying W.A.E. mail: (left to right) Fokker F-10 & F-14, Boeing 40-B4 & 95, Douglas M-5, Stearman Junior Speedmail

(*Continued from preceding page*)

partment of Commerce. Most of them are revolving beacons, flash beacons, code beacons, acetylene blinkers and acetylene routing beacons. The 125 private lights mentioned are those which have been "certified" by the Aeronautics Branch, and this number does not include several powerful private lights on various buildings which have no relation to aeronautical activity.

To obtain a certficate for a beacon, the owner must agree to operate it every night from sundown to sunrise, and also operate a "fixed projector" in addition to the revolving beacon. Its purpose is to guide the pilot to the nearest airport, and is merely a pencil of light aimed directly toward the nearby field. A pilot flying toward the beacon may take a bearing on this projector and follow its direction to the field.

There are quite a number of revolving beacons, however, which do not operate after midnight and have no projector pointing toward the airport. These are termed by the Division of Airways "false lights" and are not given certificates because in many cases they constitute a menace to night flying. A pilot who sees a billion-candle-power light twenty miles away and flies toward it only to discover that it is an advertisement for a hotel in the middle of Manhattan Island cannot be blamed for dark thoughts and considerable profanity.

F. C. Hingsburg, chief engineer, Airways Division, Department of Commerce, is in charge of certifying all these private lights. He reports that most owners are willing to coöperate with the Government in modifying their beacons to conform with regulation, and that to date he has not had to exercise the power he possesses to curb violations of the code.

AIR MAIL NOTES

Colonial Passenger Liners to Carry Mail

WHILE their contract was being renewed and the Watres air mail legislation discussed again, officials of Colonial Air Transport obtained permission from the Post Office Department to carry mail on its regular passenger run from New York to Boston on the plane leaving Boston daily at noon. This arrangement will enable Boston residents to post special-delivery mail in that city as late as 11:00 a. m. for delivery the same afternoon in New York. More important, perhaps, is the fact that this mail will catch the southbound Eastern Air Transport mail ship at 3:00 p. m. and the Boston special-delivery mail will be delivered in Philadelphia, Washington and Richmond the same afternoon.

Poundage Shows Increase for March

FOR the month of March, the total number of pounds of air mail increased 70,152 over the month of February, reports the Post Office Department. Total for March was 625,328 pounds, as compared with 555,176 pounds for February.

Thompson Now Using Diesel Engines

THE Thompson Aeronautical Corporation, carrying air mail throughout Michigan, became the first airline in America to adopt the Packard Diesel engine when one of the firm's Stinson-Detroiter monoplanes was equipped with the new power plant and sent aloft on a regular scheduled flight. Pilot Tom Hill was at the controls.

The company disclaims any feeling of neighborliness or mere friendship in the matter. The engine was installed, says Edwin G. Thompson, president, "because we believe the Diesel will be a solution to many of the pilot's problems. It has no ignition to interfere with radio transmission, for one thing."

Officials of the Packard company stated that the Thompson company planned to power additional ships with the new engine if the first one came up to expectations.

E. A. T. Loses Four Ships in Fire

ANOTHER New Jersey airport fire occurred just prior to the Newark disaster when Eastern Air Transport's hangar at Hadley Field, New Brunswick, N. J., caught fire suddenly just as the mail was due to leave on the southward trip. Four planes were lost, including the one scheduled to take the mail south while the fire was in progress. By means of the teletype machine, headquarters was notified and orders sent to Philadelphia and Richmond to rush additional planes to Hadley Field. While the hangar was still burning, the mail was loaded into a newly-arrived plane and sent southward without a moment's delay in the movement of the mail. The four planes which were destroyed at Hadley constituted the firm's entire stock at that point; consequently it was necessary to call on the other division for the equipment.

Western Air Express Operates Six Types of Mail Planes

THE accompanying illustration of an assortment of airplanes lined up on the Western Air Express airport in Los Angeles might indicate a manufacturer's demonstration of six different types of planes for six different uses. Such, however, is not the case. They are all mail planes. They range from the Fokker trimotor to the Stearman Junior Speedmail, and include the new Boeing combination mail and passenger ship, Douglas mail carrier, Stearman Speedmail and Boeing 40-B4. The Fokker F-32, says the company, will carry 8,700 pounds of mail, while the combined capacity of all the other six is only 8,000. The company hastens to add that it does not expect to carry 8,000 pounds of mail a day, but the comparison is given to "show what progress has taken place in the aviation industry within the last four years."

NEW COMPANIES AND MERGERS

South American Lines Join NYRBA

AN operating agreement between the New York, Rio and Buenos Aires Line, Inc., and two of the largest national air transport systems in South America has been announced recently from the New York office of the NYRBA line. The two concerns involved are the Chilean National Air Line, of Chile, and the Aero Lloyd Boliviana, the national airline monopoly of the Republic of Bolivia.

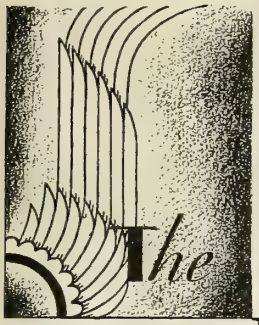
The agreement gives NYRBA a decisive position in Chili, because by its terms the Chilean line will exchange passengers, express and certain classes of mail, and give the American company access to every principal port in the republic. NYRBA, therefore, will be the only foreign airline carrying passengers in Chile. The Bolivian line will exchange passengers and express, also, and the agreement marks the first invasion of an American company into Bolivian aeronautical affairs.

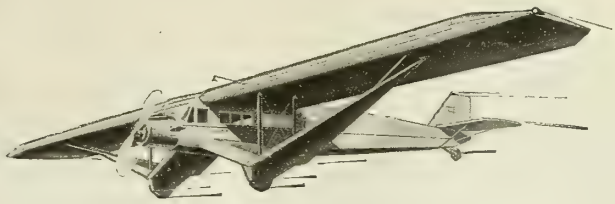
The total mileage of NYRBA's line has been increased by this agreement from 10,000 to 13,700, and all but four countries of South America now have a direct line to New York over the company's network. The schedules of the three companies have been revised so that passengers may travel, by direct connection, over the American airline to the United States. Regular weekly service is now in full operation.

Line from Newark to Pittsburgh

ABOUT the middle of April a Travel Air cabin monoplane took off from Newark Airport on the first trip of the new Pittsburgh Airways, Inc., line connecting New York and Pittsburgh. Scheduled time is four hours and fifteen minutes between the two terminals, including one stop

(*Continued on next page*)





BELLANCA AIRBUS

. . . a new 12 to 14 place airplane built for *profit-per-passenger* operation

A PROMINENT aeronautical writer recently published the following statement in the New York *Times:* "Several conservative operators, and many pilots, either never have dropped their belief in or are now adopting the doctrine of single-motored as against multimotored planes for both efficiency and safety."

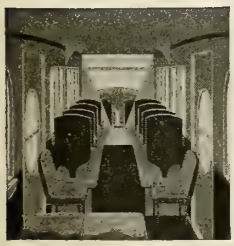
Never before has discussion so openly inquired into ways and means of cutting operating costs. On every hand, operators are seeking measures of economy which, at the same time, will maintain or increase efficiency and safety.

Alive to the needs of the day, Bellanca announces production of the new AIRBUS as an answer to this problem.

For economy, the AIRBUS will save nearly 40% of the current operating costs per passenger mile as compared with trimotored craft of similar capacity.

For efficiency, the AIRBUS merits the reputation won by its predecessors in every national efficiency contest entered since 1922, and in the commercial service rendered by Bellanca Aircraft over some of the world's most important and arduous routes.

For safety, the builders of the AIRBUS promise the same degree of self-flying stability — the same uncompromising standards of structural strength — as have been proved in the many Bellanca planes which, since 1908, have earned a perfect safety score.



Above all, the AIRBUS is a plane which passengers will like! Its large comfortable cabin carries 12 passengers and one pilot, or 11 passengers and two pilots, with ample space for baggage. Because of the unusual reserve performance, the AIRBUS will carry this large and profitable payload with utmost ease, on either wheel gear or floats, or — with a special combination of both — as an amphibian.

Here is a summary of data:

DIMENSIONS

Span	65 ft.
Length	41 ft. 3 in.
Height	12 ft. 1½ in.

POWER PLANT

Interchangeable engine mounting to accommodate the Pratt & Whitney Hornet, the Wright Cyclone, or the Curtiss Conqueror, all geared down 2:1, developing approximately 600 h.p. at 2,000 r.p.m.

USEFUL LOAD

Gasoline	200 gal.	1,200 lbs.
Oil	15 gal.	120 lbs.
Pilot		170 lbs.
Payload, 12 passengers and baggage		2,610 lbs.
Total useful load		4,100 lbs.

PERFORMANCE
(Landplane)

Full speed	145 m.p.h.
Cruising speed	120 m.p.h.
Climb	1,000 ft. per min.
Range, at cruising speed	765 miles

Now in active production, are ready to quote delivery dates for this plane to interested operators.

BELLANCA AIRCRAFT CORPORATION
New Castle, Delaware

BELLANCA

(*Continued from preceding page*)

at Camden field, near Philadelphia. The new line connects at Pittsburgh with planes from Chicago, Cleveland and the Middle West.

Travel Air monoplanes will be used for the first few months, says Theodore Taney, operations manager, until a fleet of Ford transports can be supplied by the factory. The ship leaves Newark at 9:30 a. m., stops at Camden at 10:30 a. m. and arrives at Bettis Field, Pittsburgh, at 2:30 p. m. Fare is $35 one way.

Pickwick-Pan American Agreement

PICKWICK AIRWAYS, INC., operator of the Latin-American line from Los Angeles to Guatemala and points west, has revised some of its schedules to connect with planes of the Pan American Airways at certain Central American airports, announces Charles F. Wren, president of Pickwick. Passengers are saved many hours, and sometimes days, on long journeys from the Pacific Coast to Central and South America.

Pan American will henceforth divert all of its passenger business orginating in Central or South America and destined for points on the Pacific Coast to planes of the Pickwick system; the transfer point being a town called San Geronimo, State of Oaxaca, 365 miles southeast of Mexico City. At this somewhat suburban point, all Pickwick passengers going on to South America will clamber out of the Pickwick Ryan Broughams and enter the Pan American Fokker trimotors. The new plan eliminates Guatemala City as the southern terminus, and also the city of San Salvador, which was taken off the Pickwick time-table some time ago.

N. Y.-Atlantic City One-Hour Service

BEGINNING June 1st, a passenger service with a flying time of one hour and operating five days a week will connect New York with Atlantic City. The Atlantic City terminus will be the municipal airport, located within five minutes walk of the Boardwalk. The New York field has not been announced.

The operators of the service will be New York Airways, Inc., a subsidiary of the Aviation Corporation of the Americas. The service will be in operation only during June, July, August and September. Trimotored planes will be used, but no further operating plans were revealed.

REGULATING AIR TRAVEL

A Doctor Discusses Eyesight

THE number of complaints and requests for a waiver from applicants for a pilot's license who have defective vision has led Dr. L. H. Bauer, medical director of the Aeronautics Branch, Department of Commerce, to explain why he must be so conservative.

"If the dissatisfied man will walk along a misty street on a cloudy day," remarks the doctor, "he will be able to answer his own question. A pilot's vision is not confined to straight ahead, but must be able to catch and hold impressions from all corner of his field of vision. The wearing of glasses under goggles is strictly prohibited, because then the man must see through two panes of glass, which is enough to destroy accuracy of vision. Corrected goggle lenses are also taboo, because of the likelihood of their being smeared with oil or becoming fogged. Color tests are necessary because a pilot must be able to pick an emergency field, in which case his color vision must be perfect."

To contribute another thought on the subject—a foggy window in a cabin plane is sometimes more dangerous to a pilot's vision than a partial color blindness, but to date there has been no system devised for legislating the foggy window out of the air.

"Human hazards, as well as technical hazards, must be overcome," continues the doctor. "We believe that the human element is now better in America than in any other place in the world." Quite so. If a young man can pass the high standard required by Dr. Bauer, his physical condition must be excellent.

Denver Now Has Air Police Squadron

DURING the recent bank robbery at Lamar, Col., in which five men were killed by bandits, Sheriff L. E. Alderman of Prowers County demonstrated the successful use of the airplane in man-hunts. Three of the Lamar robbers were captured as a result of the flying sheriff's efforts, and the Denver police, taking a lesson, organized a squadron of flying cops to form the foundation of a new air division.

Four policemen were selected as the basic group. All are pilots, either Army-trained or holding Department of Commerce licenses. They will be trained in the use of machine guns, shoulder weapons and the use of guns in the air. The police will thereby be ready for any emergency, said Chief Reed. Army training planes will be used.

Airport Under Quarantine

COMMERCIAL pilots in the East are notified that the airport at Lamartine, Pa., and the entire vicinity surrounding it were quarantined indefinitely by the local health department because of smallpox. Pilots are warned not to land there under penalty of being held under quarantine until the condition in ths district improves.

This order is the first recorded instance of a whole airport being quarantined for a contagious disease. Pilots were puzzled by a message which accompanied their weather reports on the New York-Chicago mail route, saying: "Notify all concerned that Lamartine Field and surrounding district is under quarantine because of smallbox. Will advise when lifted. Ronayne, Department of Commerce, Hadley Field." Investigation disclosed the details.

Department of Commerce Penalties for 122 Rule Breakers

DURING the first three months of 1930 the Aeronautics Branch, Department of Commerce, dealt with 122 violators of the Air Commerce Act and the regulations of the Department. Twenty-eight pilots were brought before the Bureau of Licenses for illegal acrobatics. Low-flying pilots totaled twenty; unlicensed pilots flying licensed planes, fourteen; flying without navigation lights, five; flying without indentification numbers, three. Miscellaneous offenses numbering fifty-two were dealt with by the Bureau.

During this period, $550 was collected in fines, and the following penalties were handed out: thirty-one reprimands, thirty suspensions, two revocations and two denials of licenses. Twenty cases were dismissed for lack of evidence.

THE PASSENGER LINES

Explanations of the Heavy Traffic

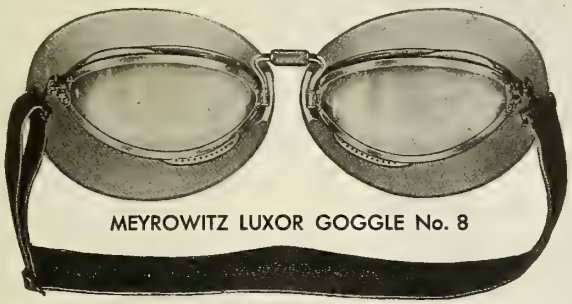
SHORTLY after the heavy fare reductions around the first of the year, interested observers watched to see the reaction in the passenger lists. This story has been told frequently, and by this time we are well aware that the response from the public was immediate and gratifying.

About the first of March, cautious statements came out from a few traffic offices. This line had a 200 per cent increase—that one claimed 300. They thought that fares would rise again after a few weeks trial. Now, satisfied that the lower fare is the only practical policy at present, all the airlines are announcing their decision to abide by the low fare. And several of them show carefully tabulated traffic statements that are nothing short of phenomenal.

Transcontinental Air Transport sends us a conservative statement governing the first eight weeks of 1930, which shows a general increase in the number of passengers carried of *more than 450 per cent* over the last eight weeks of 1929. Coast-to-coast travel has established a certain clientele of regular customers who use the lines frequently. Eastbound and westbound traffic on the transcontinental route is about equal. A large share of it is for business reasons, says the report. T. A. T.-Maddux shows its heaviest traffic is on the Eastern division between the Atlantic Seaboard and Middle West industrial centers, such as Indianapolis, St. Louis, Kansas City and Wichita, as well as on short trips between those cities. Plane mileage during the last two months has totaled 347,548, with eighteen planes in daily service. Two Curtiss Condor eighteen-passenger ships are in service on the Eastern division. The fare, which was $338.00, is now $159.93. In the eight weeks, 6,793 passengers were carried.

Colonial Air Transport's New York-Boston service is no less remarkable. In January came its first fare reduction, closely followed by another which reduced the original fare by approximately fifty per cent. In February a total of 770 passengers were carried as compared with 277 in January. This was an increase of 275 per cent. In March, the total passenger list was 1,218; a gain of 436 per cent over January and fifty-eight per cent over the previous month. The first week in April a new record of 453 passengers in six days was posted. One or more extra sections is used almost daily. On a recent Saturday the afternoon run was made in four sections, each with full load. (*Cont'd on next page*)

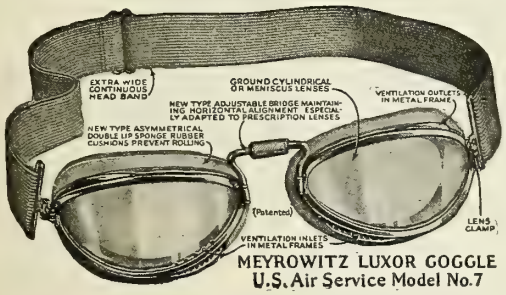
LUXOR GOGGLES



With and Without
NON-SHATTERABLE LENSES
with flaring featheredge cushions

Luxor Goggle No. 8

With white optically ground and polished (Army Type) cylindrical lenses..... **$18.00**
With white optically ground and polished (Navy Type) meniscus spherical lenses..... **$18.00**
With tinted Amber No. 1 or 2 shade or Euphos (green) 1 or 2 shade optically ground and polished meniscus lenses..... **$19.50**
With optically ground and polished Calobar meniscus lenses **$21.00**
With optically ground and polished NON-SHATTERABLE meniscus lenses..... **$36.00**
For Black Oxidized Finish add $1.50 to the above Prices.

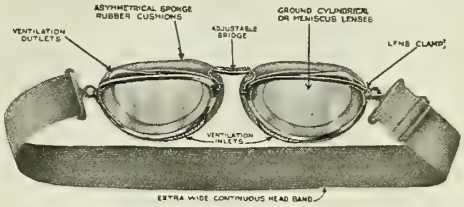


Luxor Goggles No. 7
U. S. Air Service Model

With first quality white cylindrical bent lenses **$13.75**
With first quality amber or euphos (green) and smoke tinted cylindrical bent lenses.... **$15.75**
With white hand ground and polished meniscus lenses **$18.00**
With amber or euphos (green) tinted hand ground and polished meniscus lenses..... **$19.50**
With white cylindrical ground and polished lenses in accordance to U. S. Army Specification No. 3024..... **$20.00**
With white cylindrical ground and polished decentered lenses in accordance to U. S. Army Specification No. 3024-B (If one lens is broken, the other **must be** returned to be matched) **$22.00**
With white hand ground and polished decentered meniscus lenses in accordance to Navy Spec. No. 285-D..... **$22.00**
With optically ground and polished NON-SHATTERABLE meniscus lenses..... **$34.00**

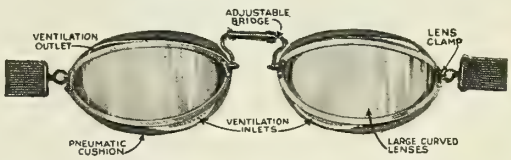


Send for 1930 catalog



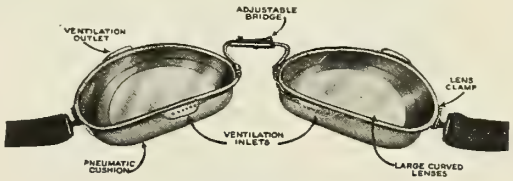
Luxor Goggles No. 6
U. S. Air Service Model

With first quality white cylindrical bent lenses **$10.75**
With first quality amber or euphos (green) and smoke tinted cylindrical bent lenses **12.75**
With white hand ground and polished meniscus lenses..... **15.00**
With amber or euphos (green) tinted hand ground and polished meniscus lenses **16.50**
With white cylindrical ground and polished lenses in accordance to U. S. Army Specification No. 3024..... **17.00**
With white cylindrical ground and polished decentered lenses in accordance to U. S. Army Specification No. 3024-B. (If one lens is broken the other must be returned to be matched.) **19.00**
With white hand ground and polished decentered meniscus lenses in accordance to Navy Spec. No. 285-D **19.00**
With optically ground and polished **NON-SHATTERABLE** meniscus lenses **32.00**



Luxor Goggles No. 6 Regular Model

With first quality white cylindrical bent lenses..... **$9.75**
With first quality amber or euphos (green) and smoke tinted cylindrical bent lenses **10.50**
With white hand ground and polished meniscus lenses **14.00**
With amber or euphos (green) tinted hand ground and polished meniscus lenses **15.50**
With first quality white cylindrical lenses (with sun shields).. **11.75**
With white cylindrical ground and polished lenses in accordance to U. S. Army Spec. No. 3024..... **16.00**
With white cylindrical ground and polished decentered lenses in accordance to U. S. Army Specification No. 3024-B. (If one lens is broken the other must be returned to be matched.) **18.00**
With white hand ground and polished decentered meniscus lenses in accordance to Navy Specification No. 285-D.... **18.00**



Luxor Goggles No. 5

With first quality white cylindrical bent lenses **$7.50**
With first quality amber or euphos (green) and smoke tinted cylindrical bent lenses..... **8.25**
With white hand ground and polished meniscus lenses..... **12.00**
With amber or euphos (green) tinted hand ground and polished meniscus lenses **13.50**

E. B. Meyrowitz
Established 1875 INCORPORATED AND ASSOCIATED COMPANIES

529 Fifth Ave., Dept. E, New York



Night scene at an airport showing illumination by Crouse-Hinds hangar floodlights, beacons and lighted wind cone

(Continued from preceding page)

With the exception of Air Ferries, Ltd., these two systems are believed to carry more passengers a day than any other passenger lines in the country, hence a glance at their records should show where the traffic is coming from, and what the general trend of passenger-carrying policy will be in the future. T. A. T.-Maddux, of course, has two eighteen-passenger ships in operation now and more scheduled for delivery. Colonial is said to be looking about for larger carriers, and is undecided until the American Airways officials can make up their minds what sort of big plane is best. Western Air Express will put two Fokker F-32's on the Los Angeles-Salt Lake run as soon as the school children are through looking at them at the new airport. Boeing's new line will use eighteen-passenger ships to inaugurate operations. Therefore, it seems as if the large capacity passenger carrier is in demand.

The bus service to and from airports will continue to flourish. Although Northwest Airways discontinued its bus service, most of the others retain it as a valuable aid to the passenger in making connections. Consolidated schedules between competing companies will come, if not now, next year. Even such embattled competitors agree upon this point; that two competing transcontinental airlines would be foolish to parallel each other's routes clear across the country and that a transfer of passengers is the best solution. The case of Pan American-Pickwick and NYRBA-South America have been described in this connection and furnish good examples of what should take place in the United States. It will be interesting to trace the progress of passenger transport during the coming summer, a full account of which will be given in the Airport and Airway section from month to month.

Thompson's Detroit-Cleveland Line to Be Permanent

THE amphibion passenger service between Detroit and Cleveland operated by the Thompson Aeronautical Corporation will be resumed shortly, having been discontinued during the winter. Advices from the company inform us that it will not be discontinued again; the problems which confronted the company last year having been solved. A complete radio transmitting and receiving equipment is to be installed in each of the T. A. C. Loening Air Yachts, with a ground installation at each terminal. Another daily trip is to be added to the schedule, and a reduction will be made in the fare. The amount of the reduction was not made public.

Tiger Stripes Adorn Airliners

CAPT. L. G. DEVANEY, superintendent of operations on the West Coast Air Transport line from Portland and Seattle to San Francisco, is authority for the statement that henceforth the Fokker trimotors used on the line will have broad yellow stripes, edged with black, on the wings. This is said to permit easy identification of the ship in the air, and announce the fact that the big plane belongs to his company. It is the final step in a complete overhaul of all W. C. A. T. flying equipment, he states.

NEW DEVICES AND METHODS

The Prospect "Airporter"

THE vehicle seen in the accompanying illustration is one which has been designed and lately placed on the market by the Prospect Fire Engine Company, Prospect, Ohio. It is a combination of a fire-fighting apparatus, ambulance, wrecker and service truck, specially designed to aid airplanes in distress at any corner of the airport or nearby district. It has everything needed for emergency work in the event of a crash, fire or injury to personnel following a crash. It can be driven over plowed fields, deep mud or snow and will take sharp corners at high speed. It has dual wheels front and rear, so as many as four punctures or blowouts might occur without diminishing speed. From the illustration, the following features can be noted:

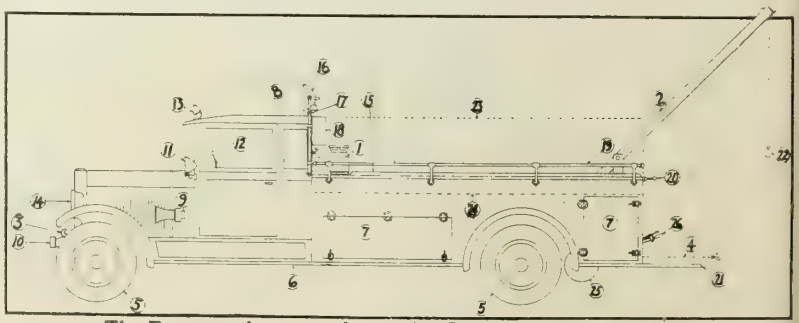
1—DuGas ten-gallon size fire extinguisher system. 2—Disappearing crane in erect position. 3—Towing eyes attached to front frame members. 4—Crane cable serves as towing eye in rear, also allowing a direct pull. 5—Dual wheels and tires front and rear. 6—Special wide running board. 7—Hinged compartment doors. 8—Trouble light with ten-foot extension. 9—Electric siren. 10—Heavy front bumper. 11—Interior control spotlights. 12—Closed, upholstered cab. 13—Road-clearing flasher signal light unit. 14—Powerful headlights with non-glare lenses. 15—Squad type seats running full length of body on each side. 16—Searchlight mounted on universal joint for use in any direction. 17—Swivel connections. 18—Collapsible top and container in closed position. 19—Hand rails running full length of body. 20—Rear hand rails. 21—Rear step or platform. 22—Crane cable and hook. 23—Outline showing collapsible top in open position. 24—Upholstered ambulance deck level. 25—Power winch. 26—Power winch operating lever.

Stout Installing Radio Beacons

FOUR complete sets of aircraft radio beacon receivers are now being installed in planes of the Stout Air Lines by engineers of the Radiomarine Corporation. The apparatus is of the remote control type which permits operation from the cockpit by either pilot or co-pilot, and will be used for beacon signals, weather reports and communication with the Department of Commerce stations.

ROSECRANS FIELD, at St. Joseph, Mo., which is a unit of Fairfax Airports, Inc., is to have a new administration building. The structure will be of English architecture.

Present plans are to dedicate the new administration building at Fairfax Airport the third of May. There will be a commodious waiting room, ticket office, barber shop, telegraph office, cigar and newsstand, baggage dock, soda grill, medical suite, rest rooms for men and women, a dining room to seat 252 people, and a dormitory in one wing



The Prospect airport service truck. See text for key to numbers

Here's the airplane you've been looking for!



WACO "Model F"
3-place open-cockpit biplane

Performance

Top Speed.....115 m.p.h.
Cruising Speed..... 95 m.p.h.
Landing Speed..... 32 m.p.h.
Rate of Climb.....1000 ft./min.

Specifications

Cockpits fully upholstered . . . molded Pyralin windshields . . . dual controls, including dual brake controls with locking feature . . . storage pockets in front cockpit . . . oleo shock struts . . . 26 x 5 non-skid tires . . . brakes . . . tail wheel.

Compass, tachometer, altimeter, oil pressure and temperature gauges . . . gasoline gauges . . . navigation lights . . . emergency kit . . . fire extinguisher.

Optional color combinations: vermillion, green or blue fuselage, with black-and-gold striping and silver wings.

Prices

With Kinner 100 h.p. engine $4100
With Warner Scarab engine. $4250
(Flyaway, WACO Field, Troy, Ohio)

WACO AIRPLANES

"Ask Any Pilot"



Gliding is great sport
and WACO has built such a glider as you would expect of WACO. Priced at $385 complete ($295 knocked down). Write for details.

. . . It almost flies itself . . . It gives you low-cost air transportation . . . It can use small landing fields

THE new WACO "Model F" has been called "the easiest-flying ship in America." It reflects the seasoning of WACO design . . . combines in one airplane all those qualities that have made WACO successful. It has every desirable quality for commercial operation and student training, but beyond this is ideally suited to the non-professional flyer who may use it for business trips or simply for the joy of getting about through the air. It has satisfying speed and responsiveness without prohibitive operating costs, is ruggedly constructed and has the characteristic "WACO Safety Factor" —the ability to get in and out of the smallest fields. And all this at a first cost which sets a new standard of value in ships of its class.

Have a flight demonstration! Note how steady it is in flight, keeping to a straight course "hands off" almost indefinitely. Yet it is instantly responsive to the controls, at any speed and any angle of attack. Note how the nose can be pulled up to the stalling point without the controls "mushing" or the plane falling off.

See how slow it comes in to a landing... 32 miles per hour... slower than you generally drive your automobile. It has no tendency to "float" and its effective dual-controlled brakes will bring it up to a dead stop in less than 125 feet. You can prove that if you care to.

Gas consumption is 12 miles or more per gallon at cruising speed, with 400 mile cruising range. Depreciation and upkeep, also, are less in most cases than for a high-grade automobile. Owner records of hundreds of previous WACOs prove it!

Demand for the "Model F" indicates that it will exceed in popularity all its famous predecessors. The waiting list for deliveries is increasing daily. We suggest that you see your nearest WACO dealer without delay . . . and will direct you to him if you wish.

THE WACO AIRCRAFT COMPANY, Troy, Ohio.

0-12

There are more WACOs in commercial service than any other American make

BOEING STARTS CHICAGO-to-COAST PASSENGER SERVICE—By Robert Johnson

LARGE passenger-carrying transports are now flying over the central route from the Mississippi River to the Pacific Coast, which has long been the main avenue of East-West rail traffic, with the inauguration on May 1 of a twenty-hour scheduled passenger service between San Francisco Bay and Chicago. Boeing System, which has operated this air mail, express and passenger route since July 1, 1927, with combination mail-passenger planes, is using a fleet of eight trimotored eighteen-passenger (or twelve-passenger and mail) Boeing transports to carry air travelers between the Great Lakes and the Golden Gate.

The company has founded the new passenger schedule on experience gained from 9,000,000 miles of day and night flying over its transcontinental and Seattle-Los Angeles routes. The planes, produced by the Boeing Airplane Company at Seattle, represent modern development in passenger aircraft, and include features designed to insure maximum comfort during the twenty-hour flight over the 2,000-mile route. The variations of terrain, flight altitudes and weather conditions along the airway impose necessarily strict requirements for equipment. Planes flying over the central transcontinental route climb from sea level to as high as 12,000 and 14,000 feet, and cross plains, mountains, deserts, forests and valleys. Temperatures sometimes vary as much as 100 degrees during one flight over this route.

There are several interesting features of the expanded Boeing service. First, it is the longest single line in the United States with a round trip day and night service on regular schedule and is the only trimotored passenger service in this country flying such long distances at night.

The schedule has been so arranged that through over-night connections at Chicago, both arrival and departure, business men of cities as distant as Buffalo, Detroit, Cleveland, Louisville, Nashville, Minneapolis and St. Paul (see illustration) can travel to or from the Pacific Coast with the loss of one business day. At Omaha the line has connections with such cities as St. Louis, Kansas City, Minneapolis and St. Paul. At Cheyenne it serves the Denver and Colorado territory, and at Salt Lake railroads and airlines radiate north, northwest, west and southwest.

Boeing's route cuts 327 miles off the train mileage and 337 miles off that of the Lincoln Highway, thus bisecting, over the shortest route, the western portion of America.

Boeing System has a traffic interchange with Stout Air Lines at Chicago, Stout operating between Chicago, Detroit and Cleveland.

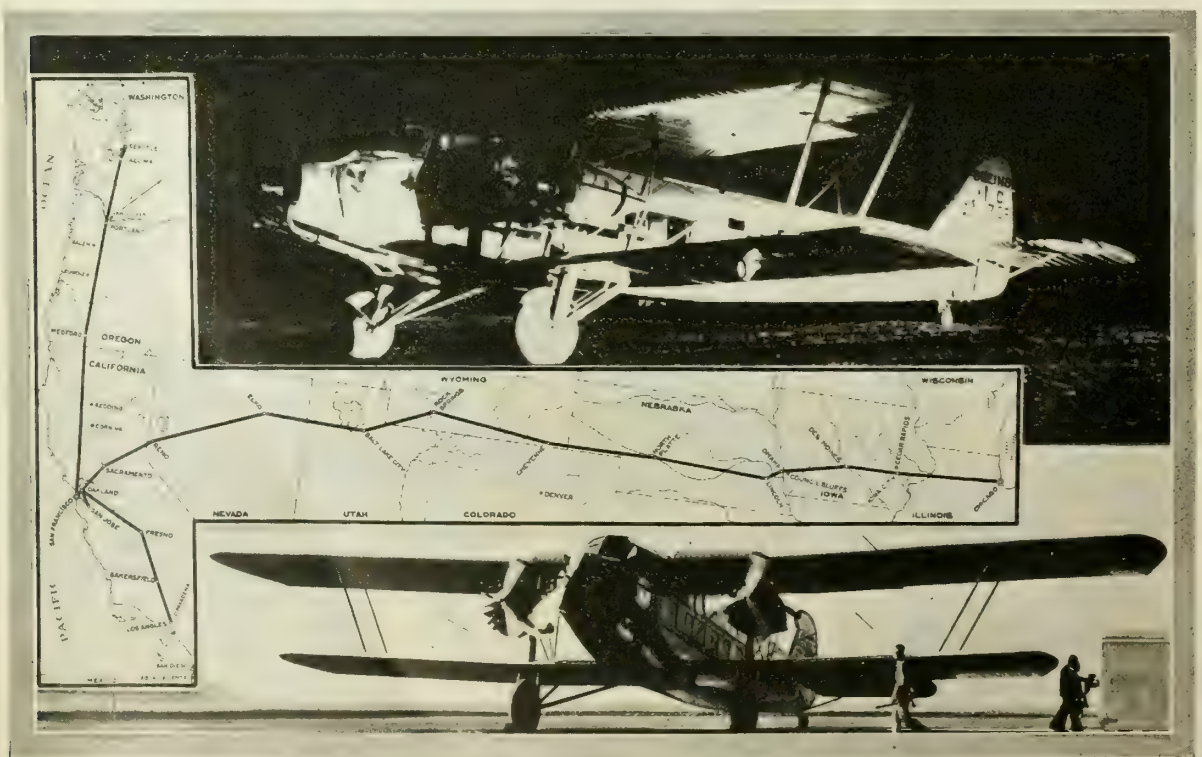
The transports are powered with three Hornet engines developing a total of 1,575 horsepower, permitting a high speed of 138 miles per hour, a ceiling of 14,000 feet, a take-off run of 750 feet and a rate of climb of 850 feet per minute. With a fuel capacity of 500 gallons, the planes have a cruising range of six hours, thus making it possible for the pilots to pass up intermediate division points in case of unfavorable weather conditions.

The passenger cabin of the transport, known as the Boeing model 80-A, includes such features for comfort as heating and ventilation systems, hot and cold running water, individual electric lights, seats with adjustable backs, and sound-proofed walls.

With the development and construction of the transport planes, Boeing set about to solve three problems before actually inaugurating the passenger service: night flying, weather difficulties, and communication between the planes in flight and the ground.

The transport company pioneered night flying of passengers over a long schedule route by starting last year a trimotored passenger service over the Salt Lake City-San Francisco division of the transcontinental route. Twelve-pasesnger Boeing transports used on this run were equipped with

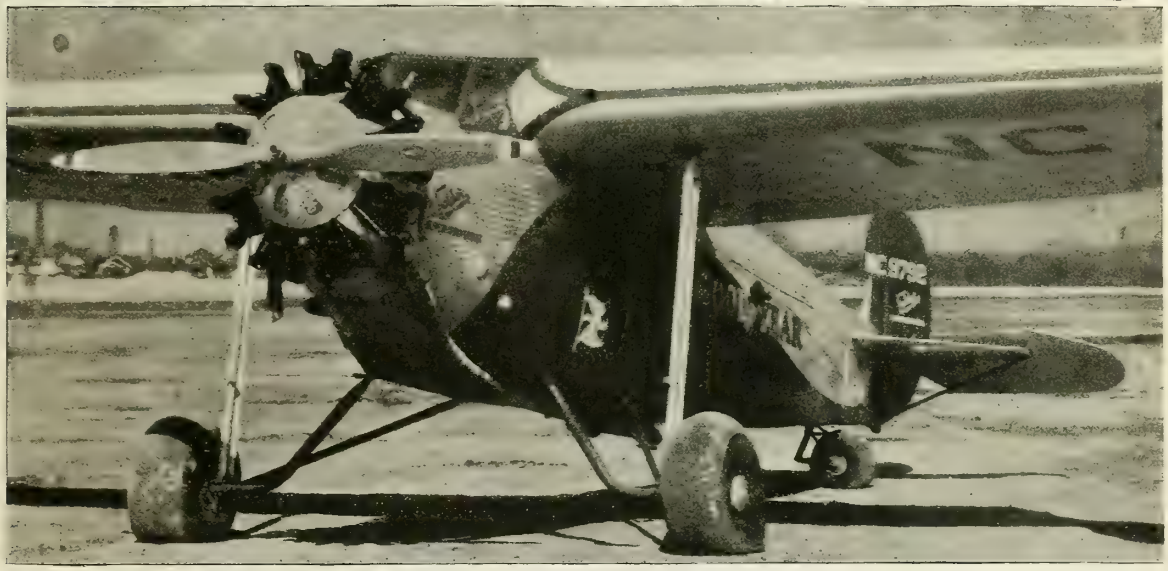
(*Continued on next page*)



On Boeing's Chicago-San Francisco passenger line flying is done both in daytime and at night. Upper, a Boeing transport after dark at an airport along the route; lower, a similar plane preparing to take off on a day flight. Center, map of Boeing lines

Here's what you can learn about

AIRWHEELS



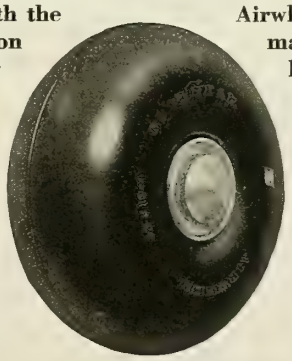
as demonstrated on a Goodyear test ship

That name "AIRWHEEL" is now well known throughout the airplane industry. It is known as the name of a tire and wheel combined — a great, yielding, tough, rolling "pillow" of rubber, built by Goodyear.

Because it is so soft (pressures range from 5 to 15 pounds) it gives a remarkable cushion to take-off or landing. It spreads out in contact with the ground, and makes landings safe even on plowed ground, on sand, on wet soggy fields — in many places where planes never dared land before.

Look at the picture and you will see that Airwheels are used for all three landing points. You will see also, that this Goodyear plane has no other shock absorbers. Think what landing gear possibilities this new product presents!

Almost every thinkable landing test has been tried with this plane, again and again. Cross-wind, down-wind landings and take-offs. Deliberate ground loops that would spell ruin with the ordinary wheel and tire equipment can be performed with entire safety on Airwheels. This is due to the fact that Airwheels permit unusual side deflection and side loading as well as vertical.



Airwheels mount directly on the hub, also made by Goodyear. Wheel failures cannot happen, because there are no wheels. Special internal brakes, self-centering, assure the most desirable airplane braking action ever known.

Write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California, for full list of sizes and for engineering data. Goodyear Airwheels are now made for planes weighing from 1000 to 20,000 pounds.

GOODYEAR

EVERYTHING IN RUBBER FOR THE AIRPLANE

(*Continued from preceding page*)

special lighting installation for night flying. Over this route, the company has flown more than 300,000 miles at night with one instance of minor injury to a passenger and a pilot. By means of this pioneering operation, the company demonstrated the feasibility of night flying with passengers, which of course was necessary for the proposed twenty-hour schedule now in effect between Chicago and San Francisco.

Airway lighting, established by the Department of Commerce, has resulted in a veritable lighted boulevard between the Golden Gate and the Great Lakes. Airway beacons are flashing at ten-mile intervals, and every three miles in the mountains are established blinker lights. In addition, there are lighted emergency landing fields every thirty miles along the line. In the transports, there are powerful landing lights on the wing tips to aid the pilots.

In the case of emergency landing, there are four parachute flares in each transport. The pilot can release these and thus effectively illuminate the ground area below him. One parachute flare will light up an area a mile and a quarter square for a period of three minutes.

The solution of an effective communication system between planes and the ground was found in a radiophone system developed by Boeing engineers in conjunction with the Department of Commerce and equipment manufacturers after much experimentation and testing. By means of this apparatus, the pilot of a transport may converse in a normal voice with the operator at a ground station as distant as 200 miles. The set in the plane, weighing but 100 pounds, is effective at altitudes as high as 14,000 feet and has a 200-mile range. Boeing System has established fourteen of these ground radio stations at regular intervals along its route, so that the transport pilots are constantly in voice communication with the ground operators.

This system materially increases the safety factor of the transcontinental flight. The number of emergency landings caused by uncertainty as to weather conditions ahead have been materially reduced by the radiophone, because pilots are constantly receiving weather reports and are aware of the conditions along the route at all times. Moreover, the payloads of the planes are increased because the radiophone eliminates the need for heavy quantities of excess gasoline which were formerly carried as a precaution against unexpected bad weather which might obscure the ground and prevent landing for some time. Traffic information, flight orders and other data are continually phoned to the pilots of the planes. The ground personnel is also able to keep an exact check on the locations of the transports at all times.

The operation of the set in the plane is not difficult, little adjusting being required on the part of the pilot. To change from transmission to reception, he merely turns a switch. The microphone and earphones are firmly attached to his helmet, and the "mike" is in position in front of his lips so that his hands are free for the control of the plane. When the transport reaches the half-way mark between the station last passed and the next station, he adjusts the set to receive the approaching station.



Passengers boarding an eighteen-passenger Boeing trimotor transport

The transport planes are also equipped for receiving the directive radio beacon service maintained by the Department of Commerce. This radio signal service is very helpful to the pilots in keeping on their course during unfavorable weather.

To insure its transport planes against weather difficulties caused by encountering unexpected storms, Boeing System has established a supplementary weather reporting service to work with the Government weather bureaus along the route. The latter report the weather conditions on the east-west airline, but do not check on the weather north and south of the route. Mobile weather reporting stations, equipped with radio broadcasting apparatus, have been sent out by Boeing at strategic points to the north and south of the transcontinental airway. These stations spot storms approaching the route and radio reports to the regular ground radiophone stations, the operators of which immediately relay the information on to the pilots of the transports. This service, supplementing the regular Government reporting bureaus, substantially increases the safety factor by preventing pilots from flying into storms against which they have not been warned.

The pilots flying the planes are men who have been associated with the Boeing company for years, flying air mail over the 2,000-mile airway. Many of these pilots were trained for the new run by serving at the controls of the trimotors being flown at night between Salt Lake City and San Francisco. Since early spring a number of the new eighteen-passenger planes have been on the route, not operating on the regular schedules, but being flown to familiarize the pilot personnel with them. No pilot without 3,000 hours of flying experience is assigned to the transport duty. Most of the Boeing pilots on this service have flown 5,000 hours or more.

Development of traffic facilities at division points and terminals has also been pushed in preparation for the service. Operating headquarters were established at Cheyenne, the half-way mark on the transcontinental route. One transport is flown from San Francisco Bay to Cheyenne, where the passengers are transferred to another plane for the remaining portion of the flight to Chicago.

At Cheyenne, besides the extensive operating and administrative plant, has been established a complete repair depot with facilities for any type of aircraft and engine repair work. A systematic and thorough plan of inspection, servicing and maintenance is, of course, one of the cardinal principles of successful air transport operations. Detailed inspection and maintenance methods in force on this route since air mail operations were started in 1927, have been proved successful by the fact that, of the original fleet of twenty-four two-passenger Boeing mail planes with which Boeing began operations, nineteen are still in active service carrying the air mail over the transcontinental airway.

After every flight, the transports are fully inspected and checked, and any repairs necessary are made immediately. The plane is refueled and its oil tanks filled as soon as it comes in from the run, so that there is no chance of a plane's being sent out on a flight without full gasoline and oil tanks. A thorough system of engine inspection and overhaul is also maintained.

Passenger facilities have been completely programmed by the traffic personnel of Boeing System, and adequate and comfortable passenger depots have been or are being built at the various points along the Chicago-Oakland-San Francisco route.

Boeing System has founded its passenger service upon principles of safety, and has taken every precaution to reduce the possibility of accident during the flight of the transports over this long route. Radiophone plane-ground and inter-plane communication, full weather reporting services, night flying facilities and practical experience in night operations, trained pilot personnel, specially built equipment, adequate ground facilities and thorough methods of plane inspection and maintenance have preceded the actual inauguration of service on this new schedule.



FOKKER

PRICES REDUCED

$4,000 *to* $13,000

CERTAIN economies have resulted from the affiliation of Fokker and General Motors. Due to production and purchasing principles, based on many years of successful experience in manufacturing, costs have been sharply reduced. Quality of material and thoroughness of construction have, of course, been maintained at the high standard the industry expects from Fokker. These economies are now manifested in the following reductions which are effective immediately:

	OLD PRICE	REDUCTION	NEW PRICE
Standard Universal—Seven places . .	$15,000	$ 4,000	$ 11,000
Super-Universal—Seven places	$21,800	$ 4,300	$ 17,500
F 14 A Mail Plane—Nine places . . .	$26,500	$ 4,000	$ 22,500
F 11 A Flying Boat—Eight places . .	$40,000	$ 7,500	$ 32,500
F 11 A Amphibion—Eight places . .	$42,000	$ 8,225	$ 33,775
F 10 A Trimotor—Fourteen places .	$67,500	$13,000	$ 54,500
F 32 Four Motors—Thirty-two places	$———	$———	$110,000

Prices Flyaway Factory

FOKKER

AIRCRAFT CORPORATION

AFFILIATED WITH GENERAL MOTORS

General Motors Building, New York City





The hangar at the new municipal air-field at Abilene, Texas

ABILENE AIRPORT IN TEXAS

DEDICATION of the airport at Abilene, Texas, recently completed at a cost of $15,000, was held May 31, and ceremonies included an air meet in which Army Air Corps and civilian planes participated. The airport is located three miles east of Abilene and the field is level and drained. All runways have been oiled and provided with an asphalt base, and landing strips with approaches will be kept open and marked for the control of traffic. Southern Air Transport and Southwest Air Fast Express, each make two scheduled stops daily at the field.

The buildings which have been erected include a hangar, fueling station, and an administration building. The hangar, measuring eighty feet by one hundred feet, is of steel construction, equipped with steel rolling doors, and has a clearance of eighty feet. The walls are of brick, covered with old ivory Italian stucco. Adjoining the hangar is a large lean-to building, containing the heating plant, offices, rest rooms, shop and transformer room.

On the first floor of the administration building is a lounge room for passengers, manager's office, ticket office and rest rooms. An apartment occupied by L. E. Derryberry, manager of the field, is on the second floor.

The fueling station serves automobiles and pumps gasoline and oil to fueling pits located on the taxi lanes. The grounds have been landscaped with flower beds, grass plots and driveways, and space for parking automobiles is provided.

The lighting system includes green approach lights located at the ends of landing strips, white boundary lights, and a 10,000,000-candlepower revolving beacon installed on a tower which surmounts the hangar. The beacon is visible from fifty miles. The name of the airport is painted on top of the hangar and the sign can be seen from a great distance.

Three large floodlights illuminate a major part of the landing area. Any one of the lights will furnish illumination sufficient for landing. The sides of the hangar are floodlighted, and obstructions are marked with red lights.

Plans for future development include the construction of a two-story hotel. This building will be of frame and stucco construction and will be surrounded by a flagstone terrace. Lawn tables and colored parasols will be placed on this terrace for the convenience of visitors observing activities at the field. On the first floor of the proposed hotel, there will be a lounge, clerk's desk, cigar stand and rest rooms. Ten rooms with baths will be located on the second floor.

The Abilene port was built by the B. Russell Shaw company under the supervision of H. B. Sudekum, chief engineer.

NATIONAL AIRPORT CONFERENCE

THE Second National Airports Conference will be held at the Hotel Statler, Buffalo, N. Y., May 14-16. A program for the study of airport problems has been arranged by the Aeronautical Chamber of Commerce, which will take steps toward obtaining a standardization of airport construction and of methods of airport management, according to a recent announcement of Frederick B. Rentschler, president of the chamber. An exhibit of airport accessories will be held at the Hotel Statler in conjunction with the conference.

All members attending the session will be placed on one of ten committees representing ten different phases of airport work including construction, operation and management. Sub-committees appointed at the first national airports conference held at Cleveland, Ohio, last year have completed the work of collecting data for use in preparing reports.

The first afternoon of the conference will be devoted to discussions by these committees meeting separately after reading of papers by the chairmen. The second day will be devoted to a report of the preceding day's discussion made by each committee chairman to the entire group. The conference banquet will be held in the evening. The third day will be devoted to a series of addresses on airport subjects, and the selection of the city for the 1931 conference will be made.

The committees are: Accounting, E. A. Johnson, chairman; Hangar Construction, Major Frank M. Kennedy, chairman; Surfacing and Drainage, T. R. Newell, chairman; Servicing and Storage, Maj. R. W. Schroeder, chairman; Sales and Advertising, R. F. Craig, chairman; Lighting, Maj. John Berry, chairman; Seaplane and Amphibion Bases, Andrew Heermance, chairman; Traffic Handling, C. W. Short, chairman; Concessions, Woodruff De Silva, chairman; Small Town Airport, Frank L. Bertschler, chairman.

B. E. Fulton, manager of the Akron Municipal Airport, will assign the members to the respective committees. The local arrangements committee is under the direction of Lieut. N. E. Duffy, manager of the Buffalo Municipal Airport. Other members of this committee are: Russell Holderman, John Berry, John Satterfield, William F. Jebb, and Joseph Dotterweich. In addition to representatives from the United States, delegations from Canada, Mexico and Central America will be present, according to the announcement.

Papers which will be read at the conference include: The Layman's View of Aviation, W. R. Needham; Radio, F. C. Hingsburg; The Weather, W. R. Gregg; and the 1930 Airport Program, B. E. Fulton.



Aerial view of Abilene Air Terminal showing the buildings constructed to date



Students and planes of the Charles Dallas, Inc., Flying Club at the Buffalo Airport. This club is the largest east of the Mississippi.

"Using Socony exclusively

. . . ample proof of my appreciation"

"It is particularly gratifying to note the excellent results in all the different types of motors I have used, regardless of weather conditions.

"The fact that I am using Socony Aviation Gasoline and Socony Aircraft Oils exclusively is ample proof of my appreciation of your products."

* * *

So writes Mr. Charles Dallas of Buffalo, distributor for Waco, Stinson, Ryan, Great Lakes, and Monoaircraft aeroplanes. The Charles Dallas Flying Club is the largest east of the Mississippi, operating six ships now, and ten ships are to be in commission by June 1st.

Only gasoline and oils of such a standard as to be completely reliable are suited to aviation purposes. It is the consensus of opinion in airports and throughout aviation circles that Socony products are of this high standard.

SOCONY

Aviation Gasoline Aircraft Oils

STANDARD OIL COMPANY OF NEW YORK

THE AIR SERVICES

FUNDS FOR NAVAL AIR STATIONS

EXPENDITURES of $2,604,000 for the improvement and construction of buildings at seven Naval Air Stations are included in the provisions of a bill passed by the Senate on April 7 and authorizing total expenditures of $10,077,500 for the development of Navy yards and other Naval stations. As we go to press, the bill is on the calendar of the House and the director of the bureau of the budget has notified the Navy Department that the proposed legislation does not conflict with the financial program of the President.

Under the terms of the bill the sum of $555,000 would be expended for the construction of buildings at the Naval Air Station, San Diego, Calif., as follows: shop for the repair of metal parts for aircraft, $130,000; gymnasium and welfare building, $150,000; and seven hangars for landplanes, $275,000. These hangars will accommodate a total of 293 landplanes and have a total of 384,500 square feet of floor space, the planes to be based at San Diego at the end of the five year aircraft building program.

The bill proposes a total expenditure of $249,000 for the construction of buildings at the Naval Air Station, Pearl Harbor, Hawaii, this sum to be expended as follows: hangar, 400 feet by 160 feet by 24 feet, $224,000; torpedo storage and charging plant, Ford Island, $25,000. The hangar which the bill proposes at Pearl Harbor would be in addition to other hangars authorized at the station. A total of 111 planes, requiring 348,000 square feet of floor space will be stationed at Pearl Harbor at the end of the five-year plane building program. Fifty-four planes of the torpedo carrying type will be attached to the Naval Air Station, Ford Island, at the end of the five-year program.

At the Naval Air Station, Coco Solo, Canal Zone, the bill provides for the expenditure of $90,000 for the construction and equipment of an aircraft overhaul shop, 300 feet by 100 feet, and with a total floor space of 33,000 square feet. At the end of the five-year program a total of ninety-three seaplanes will be stationed at Coco Solo. An appropriation of $120,000 is authorized for the erection of a bachelor officers' quarters to accommodate approximately forty bachelor officers who will be stationed there in addition to about thirty-five married officers at the end of the five-year program.

A barracks to house 250 enlisted men and a mess hall sufficient to mess 500 men would be constructed at the Naval Air Station, Lakehurst, N. J., under the terms of the bill, which provides the sum of $250,000 for this purpose. The mess hall would house recreational facilities for enlisted men. The sum of $200,000 would be expended for the erection of a gas cell shop and a storage building, 200 feet long, 156 feet wide and fifty feet in height. This building would be part of the large airship shed and would be used for the overhaul and storage of gas cells for dirigibles.

Quarters for married officers would be constructed at the Lakehurst Naval Air Station at a cost of $90,000. These quarters would be in the form of four-family apartment houses and would be in addition to facilities for seven married officers which have been constructed at the station. A total of approximately forty-four officers will be stationed at Lakehurst, according to present plans.

The bill appropriates $500,000 for the filling and grading of the flying field of the Marine Corps at Quantico, Va. It is proposed to extend the present area of the field eighty-five acres, making a total area of the field of about 235 acres. The Secretary of the Navy is authorized to enter into contract at a cost not to exceed $35,000 for the removal of telegraph and power lines located on private rights of way adjoining the Marine Corps field at Quantico and to place these lines and cables underground. A sum not to exceed $15,000 to complete the acquisition of the site of the field of the Marine Corps at Reid, Quantico, Va., is authorized, and authority is requested to expend this sum from the aviation appropriation of the Naval Appropriation Act, which was approved February 11, 1925.

The sum of $275,000 is appropriated for the construction of barracks and a mess hall for 250 enlisted men and officers at the Naval Air Station, Anacostia, D. C. This building would contain recreational facilities for enlisted men in addition to other facilities, including cobbler, tailor and barber shop, to eliminate the use of small buildings for this purpose at the station. An appropriation of $25,000 is made for the installation of a heating plant and distributing station at the Anacostia station. This plant would serve all buildings requiring heating facilities. The construction of an administration building at a cost of $200,000 at the Naval Air Station, Hampton Roads, Va., is provided. This building would be near the shops and quarters of the enlisted men and would be a two-story structure, the main section being 42 feet by 222 feet with two wings each 42 feet by 130 feet. The structure would contain office space for personnel, assembly rooms, library, classrooms and a dispensary.

The bill requests authorization for the appropriation of $9,000 for the acquisition of a site for the establishment of a Naval Air Station at Piti, Guam, in conjunction with the establishment of a Naval station at Piti, Guam.

Changes in A. C. Uniform Regulations

THE War Department has announced changes in the regulations pertaining to the uniform for the personnel of the Army Air Corps. A new field cap has been designated for officers of the Air Corps, which will be a standard design oversea cap with curtain and a piping of ultramarine blue and with golden orange threads around the edge of the curtain. The insignia of the Air Corps will be worn on the cap, the tip of the wing of the insignia being one inch from the front of the cap, and the propeller of the insignia one-half inch from the bottom of the edge of the cap. The cap that will be worn by the enlisted personnel of the Air Corps will be of the same design as that worn by the officers but without piping and insignia.

The uniform prescribed for flying missions by officers and enlisted men will be worn when their duty is such that they may be called upon to engage in flying duty.

AN aerial survey and mosaic of the field training camp and field artillery range recently established near Rapid City, Iowa, will be made by the 34th Division Aviation, Minnesota National Guard, according to a recent announcement of the Chief of the Militia Bureau. The area which will be surveyed and mapped is approximately seventy-two miles square.

Service Type Planes for Air Corps Reserve

TWENTY service type airplanes will be added to the flying equipment of the Air Corps Reserves during 1930, according to a recent announcement of the Chief of the Air Corps. These planes will be for the exclusive use of Reserve officers who have qualified to handle service type airplanes, and each Reserve field will receive at least one of these ships.

Large Class to Attend Air Corps Tactical School at Langley Field

TWENTY-FIVE officers will begin training in the Tactical School of the Army Air Corps, Langley Field, Va., during the latter part of August, according to a recent announcement of the War Department. The class will be the largest in the history of the Tactical School and will be comprised of five majors, ten captains, and ten first lieutenants. They are as follows: Majors Lawrence S. Churchill, Walter G. Kilner, S. W. Fitzgerald, Charles B. Oldfield, and Ralph P. Cousins; Capts. William V. Andrews, Lester T. Miller, Donald Wilson, Robert G. Breene, Claire L. Chennault, Idwall H. Edwards, William S. Gravely, Thomas W. Hastey, Victor H. Strahm, and Harry H. Young; Lieuts. Har-

(*Continued on next page*)

CORSAIRS

IN FOREIGN WATERS . . .

with the ASIATIC FLEET



SERVICE in the United States Navy may mean duty anywhere in the world. This is as true of airplanes as of men and battleships.

Corsair No. A-7929 has seen most of its service with the Asiatic Fleet —first with a Light Cruiser Division on board the U.S.S. Trenton, later with the Memphis.

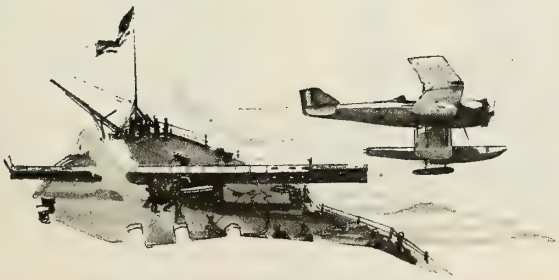
Its duties have been among the hardest any naval plane can undertake—observation.

As a naval observation plane it has been constantly catapulted into the air from the ship. Landings are made alongside the ship. Then the plane is picked up by a crane and swung aboard.

Such catapulting is naturally a severe strain on an airplane. A ship making ordinary take-offs from a smooth airport undergoes no strain which in any manner approaches it.

Corsairs are designed not only for extreme maneuverability but for a ruggedness far beyond ordinary requirements — a staunchness that enables them to meet demands few planes of any type are called upon to meet. Their performance has made them the delight of all naval pilots who fly them. CHANCE VOUGHT CORPORATION, Hartford, Connecticut. Division of United Aircraft & Transport Corporation.

CHANCE VOUGHT CORPORATION



(Continued from preceding page)

old W. Beaton, Charles C. Chauncey, George C. McDonald, William J. McKiernan, Eugene L. Eubank, E. C. Whitehead, Emil C. Kiel, W. T. Larson, Burnie R. Dallas, and George A. McHenry.

National Guard Aviation Organization

THE first step in the development of National Guard Aviation was completed recently when the 44th Division aviation units received Federal recognition. These units consist of the 119th Observation Squadron, the 119th Photo Section, and the medical department attachment, all with stations established at Newark, N. J. There is at present one observation squadron for each of the eighteen infantry divisions of the National Guard, in addition to the 154th Observation Squadron, Little Rock, Ark., which is assigned to Army aviation.

The other observation squadrons of the National Guard are as follows: 101st, 26th Division Aviation, Massachusetts; 102nd, 27th D. A., New York; 103rd, 28th D. A., Pennsylvania; 104th, 29th D. A., Maryland; 105th, 30th D. A., Tennessee; 106th, 31st D. A., Alabama; 107th, 32nd D. A., Michigan; 108th, 33rd D. A., Illinois; 109th, 34th D. A., Minnesota; 110th, 35th D. A., Missouri; 111th, 36th D. A., Texas; 112th, 37th D. A., Ohio; 113th, 38th D. A., Indiana; 115th, 40th D. A., California; 116th, 41st D. A., Washington; 118th, 43rd D. A., Connecticut; 120th, 45th D. A., Colorado.

Eight Planes for Training at Naval Academy

EIGHT new patrol planes of the type adopted as standard planes by the Navy Department will be furnished by the Naval Aircraft Factory for flying training of midshipmen at the Naval Academy during the spring, according to a recent announcement of the Bureau of Aeronautics, Navy Department. The ships to be provided for this purpose are as follows: two PN-12 twin-engine patrol planes; one F-5-L flying boat; one PN-11 twin-engine patrol plane; one XPB; one 01-8 Loening amphibion; one XPH or XPY; and one NY-3.

RANDOLPH FIELD DEDICATION IN JUNE

By M. C. COOPER

ELABORATE plans are being made at San Antonio, Texas, for the dedication ceremonies of Randolph Field which will be held June 20-21. Randolph Field is seventeen miles northeast of San Antonio. Sponsored by the local chapter of the National Aeronautic Association and the San Antonio Chamber of Commerce, a general committee has been appointed from the membership of the two groups to arrange details for the two-day celebration. Present plans of officials of the Government include the centralization of the heavier-than-air training activities of the Air Corps at Randolph Field.

According to Capt. Arthur W. Parker, construction engineer, over one hundred buildings will be under construction when the dedicatory ceremonies are held. A large quartermaster warehouse and an Air Corps warehouse will have been completed, and six officers' barracks will be near completion. All the roads have been laid out and gravelled and the visitors attending the ceremonies will be invited to inspect over eighteen miles of streets now completed. It is estimated that at that time several million dollars will have been expended on the construction of the field, excluding the sum of over $500,000, the cost of the 2,400-acre field, which was given to the Government by the city of San Antonio. The total cost will be over $30,000,000 when construction has been completed.

Dedication ceremonies will start at 10 o'clock on the morning of the 20th. The program will include addresses by prominent speakers and an aerial exhibition. Over 200 military planes from Brooks Field, Kelly Field, Ft. Crockett, Galveston, and Ft. Sill, Okla., will participate in the maneuvers.

On the evening of June 20, a banquet will be held at a San Antonio hotel. On the morning of the 21st, the June class will be graduated from Kelly Field, the Advanced Flying School of the Army Air Corps at San Antonio. Aerial exhibitions will be held by the members of the class and will be included in the dedicatory ceremonies of Randolph Field. Aerial maneuvers will include acrobatics, individual combat by pursuit instructors, balloon strafing by pursuit instructors, dropping of machine guns and operating personnel by parachutes, pursuit formation flying and attack group exercises.

Following these maneuvers, graduating students will be presented with wings and certificates in exercises which will be held in the assembly hall at Kelly Field. The final event of the celebration will be an aviation ball held in the municipal auditorium at San Antonio.

Invitations have been extended to persons in Latin America and the United States to attend the dedication. Jack Beretta, governor for Texas of the National Aeronautic Association, is general chairman of the committee in charge of the ceremonies. Subcommittees have been appointed as follows: general arrangements committee, Brig. Gen. Frank P. Lahm; invitations committee, Wm. McIntosh; publicity committee, Porter Whaley; banquet committee, B. R. Webb; ball committee, Jack Crain; finance committee, Franz Groos; traffic committee, Phil Wright. Offices have been opened for committee work at 1204-10, National Bank of Commerce Building, San Antonio.

Personnel in the Naval Air Service

A TOTAL of 577 commissioned officers and twenty-one warrant officers were affiliated with the Naval Air Service on March 1, 1930, according to a recent announcement of the War Department. There were 211 pilots engaged in Naval aviation. The officers included one rear admiral, five captains, sixteen commanders, seventy-two lieutenant-commanders, 249 lieutenants, 163 lieutenants of the junior grade, and fifty-eight engineers.

There were 417 aviation officers enrolled in the Naval Reserve.

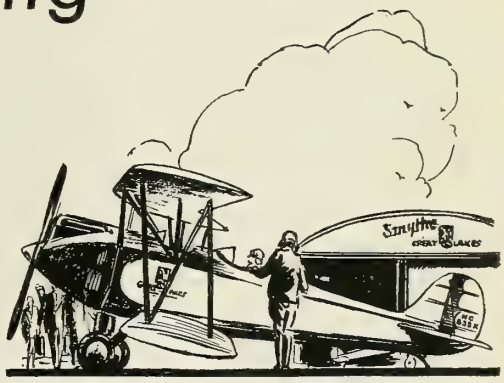


(Left) Maj. H. H. Arnold and Maj. Thomas DeWitt Milling, pioneers in military aviation, in 1911 when the army's air strength consisted of two planes. (Right) Maj. Arnold and Maj. Milling, and one of the latest type observation planes of the Air Corps

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TECHNICAL

HOW THE DEPT. OF COMM. TESTS ENGINES FOR APPROVED-TYPE CERTIFICATES

THE Aeronautics Branch of the Department of Commerce protects the flying public by requiring that all licensed aircraft be equipped with power plants approved by the Secretary of Commerce as to their airworthiness.

Before any aircraft engines can be approved by the Secretary of Commerce, they must be type tested. In order to conduct these type tests, the Aeronautics Branch, through the engine testing section of the Bureau of Standards, recently completed a new testing laboratory at Arlington Farms, near Hoover Field, Va., a few minutes' journey from the Department of Commerce. This plant comprises three separate testing units—each of which has a torque stand on which the engine is mounted and an observing room which houses the instruments and the testing staff. Also provided at this testing plant is a shop room especially equipped for disassembly and inspection of engines after test, and for minor servicing during test.

The plant includes a furnace room providing central heating for the entire unit, an office and a record room, and a separate concrete building for the storage of gasoline and oil, designed for protection from fire and explosion hazards.

The entire plant is a most satisfactory modern testing unit—designed especially for convenience and speed in the mounting, testing, and inspection of engines. With all three torque stands in daily operation, the plant will turn out at least one complete engine type test per week with a regular staff of engineers. This output, moreover, can be doubled by the use of additional personnel if this should become necessary.

Here each new type of aircraft engine which has not already been tested by the Army or Navy for military purposes, must pass a special test which is conducted by Department of Commerce engineers. The imperative necessity for this requirement is clearly indicated by the fact that whereas there are only about four different kinds of automobile engines in the United States, there are over sixteen more or less separate and distinct aircraft engine classifications. The automobile engines in regular use today are limited almost entirely to the six-in-line (vertical), the four-in-line, the "V-type," and the straight-eight. Aircraft engines, on the other hand, which are now available include the two-cylinder opposed, the three-cylinder radial, the four-in-line, the four-in-line inverted, the six-in-line, the six-in-line inverted, the five-cylinder radial, the six-cylinder radial with two-throw crankshaft, the seven-cylinder radial, the eight-V, the eight-horizontal or opposed, the nine-radial, the twelve-V, the twelve-V inverted, the twelve-W, the eighteen-W, and the twenty-four-cylinder X. With a few exceptions, which are experimental types, all of these aircraft engines are now commercially available.

Moreover, whereas virtually all automobile engines are designed for water-cooling, aircraft engines are cooled in at least three different ways. A large number are air-cooled, but there are also a number which are cooled with either water or "glycol." Among the factors which are taken into consideration by aircraft engine designers are, not only increased brake horsepower, but decreased head resistance, better visibility for the pilot, and accessibility for repairs on the ground as well.

In order to have an aircraft engine tested for an Approved Type Certificate the manufacturer informs the Department of Commerce that the engine is ready for test. The Department then sends a copy of Aeronautics Bulletin 7-A entitled "Airworthiness Requirements of Air Commerce Regulations," and informs the manufacturer of the preliminary requirements. Thereupon, the manufacturer undertakes to qualify by conducting a preliminary bench test of twenty-five hours' actual operation, twenty hours of which must be at a speed not less than ten per cent under the rated speed, and five hours of which must be at full throttle at the rated speed. After meeting these qualifications the engine is placed upon the Department's pending list and awaits its regular turn.

Test Procedure

The engine is assigned a tentative date for the beginning of the test—the manufacturer being notified to have the engine at the engine-test laboratory at least five days before the date assigned. The Government requires that the manufacturer supply fuel and oil for the conduct of the test, but does not require that the manufacturer furnish an engineer or a mechanic. This, however, is desirable in order to assure the manufacturer's unqualified approval of carburetion and ignition and other adjustments.

According to the aircraft engine requirements of the Department of Commerce, a fifty-hour endurance test shall be run in ten five-hour periods. During the first five hours the engine shall be run with the throttle wide open, the speed being at least equal to the rated speed specified by the manufacturer. The power rating of the engine will be based on the average horsepower developed during the first period. During the remaining nine periods, the engine shall be run at approximately ninety-seven per cent of the rated speed, and the horsepower developed should at no time be less than nine-tenths of the rated horsepower.

During the test not more than three forced stops shall be allowed. A penalty run of two hours will be added to any period in which a forced stop is made. If the speed during a propeller-load run drops to less than ninety-four per cent of rate speed, or the power in a dynamometer run drops as much as ten per cent, this shall constitute a forced stop. Excessive water, fuel, or oil leaks developing at the engine shall constitute forced stops. In all cases the Department of Commerce shall be the judge as to what constitutes a forced stop.

Minor repairs and replacements may be made between test periods if suitable tools and parts are available, but the test schedule shall not be delayed on this account. The failure of a major part of the engine shall terminate the test.

If the engine is submitted for test without qualifications as to fuel, any available gasoline meeting the Federal specifications for United States motor gasoline may be used. If the manufacturer does not consider that his engine can be run safely on all grades of motor gasoline, the engine shall be tested on the grade of fuel which he specifies and will be certified only for use on fuel of this grade or better.

Test Completed

On completion of the fifty-hour endurance block test, the necessary runs will be made to obtain a curve of power against speed by varying the load with the throttle wide open. Readings will be made at speeds ranging from seventy-five per cent of normal speed to approximately 110 per cent of normal speed. Each speed will be maintained for at least five minutes before a reading is taken.

After the test is completed, a detailed report is submitted by the engine-testing section to the director of air regulations, who in turn transmits copies of the final report to the manufacturer whose engine has been tested.

Each engine tested by the Department is either (1) approved, or (2) approved provided minor improvements are made, or (3) rejected with the recommendation that certain changes be made before the engine is again submitted for test. At the completion of the block test a complete tear-down and detailed inspection of engine parts are made to determine excessive wear or signs of failure. At the option of the Department of Commerce, a tear-down inspection of the engine may be made prior to the

(*Continued on page* 114)

AIRCRAFT ENGINES MANUFACTURED IN THE UNITED STATES

LISTED ACCORDING TO HORSEPOWER RATINGS

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Prepared especially for Aero Digest by D. W. Huntington

Rated B.H.P. and R.P.M.	A.T.C. No.	ENGINE MODEL	NAME AND ADDRESS OF MANUFACTURER		TYPE	No. of Cyls.	Stroke Cycle	Cooling	Wgt. Dry Less Hub and Starter (Lbs.)	Wgt. Per H.P. (Lbs.)	Bore (Ins.)	Stroke (Ins.)	Displacement (Cu.In.)	Compression Ratio	Fuel Consumption Lbs./H.P./Hr.	Oil Consumption Lbs./H.P./Hr.	Ignition System and M'f'r.	Carburetion System and M'f'r.	Valves		Prop. Drive	Starter Provided For	Length Over All Less Starter (Ins.)	Height or Diam. Over All (Ins.)	Mounting Bolt Diam. or Width (Ins.)
																			Intake Per Cyl.	Exhaust Per Cyl.					
20 at 1750		79	Irwin Aircraft Co.	Sacramento, Cal.	X	4	2	A	60	3	2.875	2.75	79.0	5.0	.60	.03	M-1-BO	1-	O	O	D		18.0	23.0	12.0
30 at 2500		Aeronca	Aeronautical Corp. of America	Cincinnati, Ohio	Opposed	2	4	A			4.125	4.0									D				
30 at 1800		SR-3	Szekely Aircraft & Eng. Co.	Holland, Mich.	A	3	4	A	142	4.74	4.125	4.75	190.0	4 6.1	.60	.016	M-2-SC	1-ST	1	1	D			31.0	
55 at 1900	4	Velie M-5	Lambert Aircraft Eng. Co.	Moline, Ill.	Radial	5	4	A	223	4.06	4.125	3.75	250.6	5.2	.55	.025	M-2-SC	1-ST	1	1	D	E	30.0	37.0	12.75
65 at 1950	12	S-D	Le Blond Aircraft Eng. Corp.	Cincinnati, Ohio	Radial	5	4	A	222	3.70	4.125	3.75	250.58	5.42	.58	.13	M-2-SC	1-ST	1	1	D	E-11	22.375	32.75	
70 at 1800		SR-5	Szekely Aircraft & Eng. Co.	Holland, Mich.	Radial	5	4	A	186	2.66	4.125	4.75			.60	.016	M-2-SC	1-ST	1	1	D			31.0	
75 at 1975	37	Rover-R-267	Michigan Aero Eng. Co.	Lansing, Mich.	Line (Inv.)	4	4	A	220	2.93	4.125	5.0	267.28	5.1	.55	.010	M-2-SC	1-ST	1	1	D	A-E-11	42.25	31.875	
85 at 1950		Junior	Warner Aircraft Corp.	Detroit, Mich.	Radial	5	4	A	230	2.7	4.25	4.25	301.4	5.2	.55	.02	M-2-SC	1-ST	1	1	D	A-E-11	29.0	36.25	17.0
90 at 1900	Yes	Gipsy-4-318	Wright Aeron. Corp.	Paterson, N. J.	Line	4	4	A	285	3.17	4.5	5.0	318.0	5.1	.55	.012	M-2-SC	1-ST	1	1	D	11	45.25	34.00	11.687
90 at 1900		Gipsy	Wright Aeron. Corp.	Paterson, N. J.	Line (Inv.)	4	4	A	285	3.17	4.5	5.0	318.0	5.1	.55	.012	M-2-SC	1-ST	1	1	D	11	45.25	34.00	11.687
90 at 2375	38	R-266	Lambert Aircraft Eng. Co.	Moline, Ill.	Radial	5	4	A	214	2.38	4.25	3.75	266.0	5.55	.58	.020	M-2-SC	1-ST	1	1	D	E	30.375	33.00	
90 at 1700	33	Brownback Tiger	Light Mfg. & Foundry Co.	Pottstown, Pa.	Radial	6	4	A	273	3.04	4.13	4.93	397.0	4.8	.56	.012	M-2-BO	1-ZE	1	1	D		29.25	37.0	13.0
90 at 2000		D-333	Chevrolet Aircraft Corp.	Baltimore, Md.	Line (Inv.)	4	4	A	280		4.5	5.23					M-2-BO	1-ZE	1	1	D		38.875	29.75	11.0
90 at 1975	20	7-D	Le Blond Aircraft Eng. Corp.	Cincinnati, Ohio	Radial	7	4	A	285	3.17	4.125	3.75	350.7	5.35	.58	.013	M-2-SC	1-ST	1	1	D	E-11	23.062	32.75	
90 at 1925		Pirate	Menasco Motors, Inc.	Los Angeles, Cal.	Line (Inv.)	4	4	A	270	3.0	4.5	5.125	326.0	5.50	.53	.010	M-2-SC	1-ST	1	1	D	E-11	45.5	28.25	13.5
95 at 2100	30	Mark III	Amer. Cirrus Engines, Inc.	Marysville, Mich.	Line	4	4	A	275	3.0	4.375	5.125	310.0	5.4	.54	.021	M-2-SC	1-ST	1	1	D		38.5	36.375	18.75
95 at 2100		Ensign	Amer. Cirrus Engines, Inc.	Marysville, Mich.	Line (Inv.)	4	4	A	275	3.0	4.375	5.125	310.0	5.4	.54	.021	M-2-SC	1-ST	1	1	D		38.5	36.375	18.75
100 at 1800	3	K-5	Kinner Airplane & Motor Corp.	Glendale, Cal.	Radial	5	4	A	280	2.8	4.25	5.25	372.0	5.1	.55	.035	M-2-SC	1-ST	1	1	D	A-11	32.25	43.00	14.0
110 at 1850	2	Scarab	Warner Aircraft Corp.	Detroit, Mich.	Radial	7	4	A	275	2.5	4.25	4.25	422.0	5.2	.55	.02	M-2-SC	1-ST	1	1	D	A-E-11	29.0	36.25	17.0
110 at 1550	11	Bear	Dayton Airplane Eng. Co.	Dayton, Ohio	Line	4	4	A	375	3.4	4.5	7.0	445.0	5.3	.53	.013	M-2-BO	1-ZE	1	1	D		47.875	38.625	16.0
110 at 2000		6-370	Fairchild Airplane Mfg. Co.	Farmingdale, N. Y.	Line (Inv.)	6	4	A	325	2.96	3.937	5.125	374.4		.56	.008	M-2-SC	1-ST	1	1	D				
115 at 1925	41	Rad-B	Aeromarine Plane & Motor Co.	Keyport, N. J.	Radial	9	4	A	380	3.30	3.875	4.75	505.0	4.76	.55	.01	M-2-SC		2	2	D	E	31.00	38.00	
120 at 1800	Yes	Crusader	Curtiss Aero & Motor Co.	Garden City, N. Y.	Line (Inv.)	6	4	A	345	2.88	4.125	5.50	441.0				M-2-SC	1-ST	1	1	D	E	56.813	32.765	16.00
125 at 1925	24	Hess-Warrior	Alliance Aircraft Corp.	Alliance, Ohio	Radial	7	4	A	295	2.36	4.5	4.5	447.0	5.2	.58	.025	M-2-SC	1-ST	1	1	D	E	27.25	37.0	
125 at 1450		Quick	Quick Air Motors Co.	Wichita, Kan.	Radial	9	4	A	355	2.60	4.13	5.5	667.0	5.0			M-2-SC	1-ZE	1	1	D		39.0	38.0	
130 at 1800		H-526	Hallet Aero Motors	Los Angeles, Cal.	Radial	7	4	A	425	3.26	4.375	5.0	526.0	5.2			M-2-BO	1-ZE	1	1	D		37.00	46.0	18.50
135 at 1850		Beetle-K	Kimball Aircraft Corp.	Naugatuck, Conn.	Radial	7	4	A	380	2.82	4.5	5.25	585.0	5.0	.54	.030	M-2-SC	1-ST	1	1	D	E	37.75	45.0	17.00
150 at 1800	16	B	Axelson Aircraft Eng. Co.	Los Angeles, Cal.	Radial	7	4	A	420	2.8	4.5	5.5	612.3	5.0	.55	.017	M-2-SC	1-ST	1	1	D	A-1	37.75	45.0	16.25
150 at 1850	Yes	Panther	MacClatchie Mfg. Co.	Compton, Cal.	Radial	7	4	A	410	2.8	4.5	5.5	612.15	5.1	.56	.023	M-2-SC	1-ST	1	1	D	E-11	36.0	36.0	
150 at 1800	9	D-7	Comet Engine Corp.	Madison, Wisc.	Radial	7	4	A	395	2.64	4.5	5.5	612.0	5.1	.55	.025	M-2-SC	1-ST	1	1	D		35.625	46.875	17.5
165 at 2000	32	A-70	Continental Aircraft Eng. Co.	Detroit, Mich.	Radial	7	4	A	425	2.58	4.625	4.625	544.0	5.4	.55	.03	M-2-SC	1-ST	1	1	D		38.00	41.75	20.0
165 at 2000	23	R-540	Wright Aeron. Corp.	Paterson, N. J.	Radial	5	4	A	370	2.24	5.0	5.5	540.0	5.1	.55	.035	M-2-SC	1-ST	1	1	D	A-E-11	40.625	45.0	19.25
170 at 1800	Yes	L-7-1	Western Enterprise Eng. Co.	Los Angeles, Cal.	Radial	7	4	A	480	2.82	4.75	6.0	744.25	5.0	.55	.021	M-2-SC	1-ST	1	1	D		28.0	39.0	
185 at 2000	5	Challenger	Curtiss Aero. & Motor Co.	Garden City, N. Y.	Radial	6	4	A	420	2.27	5.125	4.875	603.0	5.2	.55	.02	M-2-SC	1-ST	1	1	D	A-E-11	42.156	42.625	18.50
190 at 1900		R-715	Kinner Airplane & Motor Corp.	Glendale, Cal.	Radial	5	4	A	415	2.18	5.625	5.75	715.0	5.0	.60	.02	M-2-SC	1-ST	1	1	D	E-11	34.812	49.375	19.75
210 at 1975	42	R-680	Lycoming Mfg. Co.	Williamsport, Pa.	Radial	9	4	A	470	2.24	4.625	4.5	680.04	5.2	.55	.025	M-2-SC	1-ST	1	1	D	11		43.75	19.25
220 at 2000	13	J5-9	Wright Aeron. Corp.	Paterson, N. J.	Radial	9	4	A	500	2.28	4.5	5.5	788.0	5.2	.53	.035	M-2-SC	1-ST	1	1	D	A-E-11	33.75	45.00	19.25
225 at 2000	26	R-760	Wright Aeron. Corp.	Paterson, N. J.	Radial	7	4	A	425	1.89	5.0	5.5	756.0	5.1	.55	.035	M-2-SC	1-ST	1	1	D	A-E-11	40.75	45.00	19.25
225 at 1950	43	DR-980	Packard Motor Car Co.	Detroit, Mich.	Radial	9	2	A	510	2.26	4.812	6.0	982.0		.46	.01	Diesel	None	D	11-E	36.75	45.68	
260 at 1500		B-2	Menasco Motors, Inc.	Los Angeles, Cal.	Radial	9	4	A	542	2.08	4.92	6.7	1140.0	5.2	.44	.025	M-2-SC	1-ZE	1	1	D	E-11	38.5	49.125	
300 at 2000	21	R-975	Wright Aeron. Corp.	Paterson, N. J.	Radial	9	4	A	520	1.735	5.0	5.5	975.0	5.1	.55	.035	M-2-SC	1-ST	1	1	D	A-E-11	41.437	45.0	19.25
300 at 2000	39	Wasp Junior	Pratt & Whitney Aircraft Co.	Hartford, Conn.	Radial	9	4	A	550	1.835	5.187	5.187	985.0		.55	.025	M-2-SC	1-ST	1	1	D	A-E-11	41.125	45.75	23.375
410 at 1800		V-1410	Allison Engineering Co.	Indianapolis, Ind.	Vee (Inv.)	12	4	A	1000	2.44	4.625	7.00	1410	5.3	.55	.03	B-2-DE	D-ST	1	1	D	E	78.50	46.75	17.00
410 at 1800		VC-1410	Allison Engineering Co.	Indianapolis, Ind.	Vee (Inv.)	12	4	A	1125	2.75	4.625	7.00	1410	5.3	.55	.03	B-2-DE	D-ST	1	1	G	E	85.125	46.75	17.00
420 at 1700		V-1650	Allison Engineering Co.	Indianapolis, Ind.	Vee (Inv.)	12	4	L	885	2.11	5.00	7.00	1650	5.4	.55	.03	B-2-DE	D-ST	1	1	D	E	74.25	46.50	17.00
420 at 2000	14	Wasp	Pratt & Whitney Aircraft Co.	Hartford, Conn.	Radial	9	4	A	688	1.64	5.75	5.75	1344	5.25	.55	.035	M-2-SC	D-ST	1	1	D	E	42.562	50.625	23.375
420 at 2100		Geared Wasp	Pratt & Whitney Aircraft Co.	Hartford, Conn.	Radial	9	4	A	755	1.80	5.75	5.75	1344	5.25	.60	.035	M-2-SC	D-ST	1	1	G	E	47.00	50.625	23.375
435 at 2300	10	D-12	Curtiss Aero. & Motor Corp.	Garden City, N. Y.	Vee	12	4	L	680	1.57	4.50	6.00	1145	5.30	.52	.015	M-2-SC	1-ST	2	2	D	E	57.50	39.00	15.75
525 at 1900	17	Cyclone R1750	Wright Aeron. Corp.	Paterson, N. J.	Radial	9	4	A	787	1.50	6.00	6.875	1750	5.0	.60	.035	M-2-SC	D-ST	1	1	D	E	39.25	53.937	23.375
525 at 1900	15	Hornet	Pratt & Whitney Aircraft Co.	Hartford, Conn.	Radial	9	4	A	785	1.50	6.125	6.375	1690	5.0	.55	.035	M-2-SC	D-ST	1	1	D	E	44.625	55.437	23.375
525 at 1900	28	Hornet A	Pratt & Whitney Aircraft Co.	Hartford, Conn.	Radial	9	4	A	885	1.69	6.125	6.375	1690	5.0	.55	.035	M-2-SC	D-ST	1	1	G	E	44.625	54.75	23.375
550 at 1950		Geared Hornet	Pratt & Whitney Aircraft Co.	Hartford, Conn.	Radial	9	4	A	875	1.59	6.25	6.75	1860	5.0	.60	.035	M-2-SC	D-ST	1	1	G	E	48.00	56.75	23.375
575 at 1950	29	Hornet B	Pratt & Whitney Aircraft Co.	Hartford, Conn.	Radial	9	4	A	800	1.39	6.25	6.75	1860	5.0	.60	.035	M-2-SC	D-ST	1	1	D	E	44.562	56.75	23.375
600 at 2200	8	Chieftain	Curtiss Aero. & Motor Corp.	Garden City, N. Y.	Radial	12	4	A	900	1.5	5.625	5.5	1690	5.4	.60	.025	M-2-SC	2-ST	2	2	D	E	51.687	45.25	23.375
600 at 2400	6	Conqueror	Curtiss Aero. & Motor Corp.	Garden City, N. Y.	Vee	12	4	L	760	1.27	5.125	6.25	1569	5.8	.52	.015	M-2-SC	2D-ST	2	2	D	E	63.062	36.625	15.75
600 at 2450	7	Geared Conq'r	Curtiss Aero. & Motor Corp.	Garden City, N. Y.	Vee	12	4	L	850	1.42	5.125	6.25	1569	5.8	.52	.015	M-2-SC	2D-ST	2	2	G	E	63.062	36.625	15.75
600 at 2500	18	8A-1500 Geared	Packard Motor Car Co.	Detroit, Mich.	Vee	12	4	L	880	1.47	5.375	5.50	1530	5.5	.52	.025	B-2-DE	2-ST	2	2	G	E	65.00	38.25	15.75
600 at 2500		8A-1500	Packard Motor Car Co.	Detroit, Mich.	Vee	12	4	L	760	1.27	5.375	5.50	1530	5.5	.52	.015	B-2-DE	2-ST	2	2	D	E	62.343	38.25	15.75
600 at 2500		8A-1500	Packard Motor Car Co.	Detroit, Mich.	Vee (Inv.)	12	4	L	780	1.30	5.375	5.50	1530	5.5	.52	.015	B-2-DE	2-ST	2	2	D	E	62.343	38.625	16.25
800 at 2000	19	8A-2500	Packard Motor Car Co.	Detroit, Mich.	Vee	12	4	L	1160	1.45	6.375	6.5	2539	5.8	.52	.015	B-2-DE	2-ST	2	2	D	E	76.00	36.125	18.25
800 at 2000		8A-2500	Packard Motor Car Co.	Detroit, Mich.	Vee	12	4	L	1380	1.73	6.375	6.5	2539	5.8	.52	.015	B-2-DE	2-ST	2	2	G	E	76.00	36.125	18.25

RATED H. P. is A. T. C. Rating or Manufacturer's Rating.
MAXIMUM H. P. is limited by Commerce Department Regulations to 105% of Rated H. P.
COOLING: A = Air. L = Liquid (Water or Prestone).

IGNITION: M = Magneto. B = Battery. SC = Scintilla. BO = Bosch. DE = Delco.
CARBURETER: ST = Stromberg. ZE = Zenith. D = Dual.
PROP DRIVE: D = Direct. G = Geared. STARTER: A = Air. E = Electric. H = Hand.

(*Continued from preceding page*)

fifty-hour endurance test. At the option of the Department, too, after the engine has successfully passed the required block test, a bench test of the carburetor may be made to determine whether the carburetor will continue to supply a satisfactory mixture when it is tilted at various angles.

After successfully passing the required block test, each engine must be installed in an airplane by the manufacturer and given an actual service test of at least ten hours in the air, which shall include a climb at full throttle to the service ceiling of the airplane. The Department also specifies that no approved engine installed in a licensed airplane shall be equipped with a propeller so designed or adjusted that at full throttle the engine speed will exceed the official rated speed by more than five per cent in level flight at approximately sea-level altitude. The maximum allowable speed for a particular engine may be less than 105 per cent of the rated speed if the engine manufacturer so desires and specifies.

A Typical Test

The object of each test, of course, is to determine whether that particular engine should be approved for use in licensed aircraft, and with what rating.

First the engine is mounted on a torque stand having a sixty-three-inch torque arm and fitted with a four-blade wooden test propeller for the endurance test, and a two-blade adjustable pitch metal propeller for the calibration run. The torque is measured on a mercury scale to the nearest one-fourth pound—three readings being taken and averaged for each half-hour interval. Barometer readings are taken every half hour and air temperatures are read on a calibrated liquid-in-glass thermometer.

A stop watch is used to obtain the time required for the consumption of five pounds of fuel; the oil consumption is determined by weighing at the end of each half-hour interval; revolutions per minute are adjusted approximately by using a centrifugal type tachometer and accurately determined by using a revolution counter and stop watch. A test gauge is provided to indicate oil pressure and two distance-type thermometers are used to indicate the engine oil inlet and outlet temperatures.

A mercury manometer indicates the vacuum at the inlet port. The carburetor air temperature is determined by reading a liquid-in-glass thermometer located in the torque stand room. Four thermocouples are used to measure the cylinder head and cylinder barrel temperatures on cylinders numbers 2 and 3. Two pitot tubes are arranged to indicate, on water manometers, the air velocity past the cylinder heads and cylinder barrels, respectively. All instruments used are calibrated by the Bureau of Standards, and corrections applied whenever necessary.

After the completion of the endurance test, the engine calibration run is made on the torque stand. During this calibration run, an air straightening grid is placed between the propeller and the engine. This makes possible the plotting of that particular engine's full throttle power curve.

Day-to-day notes are made while the engine is running on the stand, which show that the engine ran satisfactorily at all times and that no replacements or repairs were made during the test. Perhaps the oil-pressure regulator and the valve tappets were the only parts adjusted.

Furthermore, it might be said that the preliminary and check runs consumed three hours and thirty-five minutes and that the endurance tests consumed fifty-three hours and eighteen minutes. The entire running time, therefore, was fifty-six hours and fifty-three minutes. A complete detailed log of the fifty-hour tests is submitted with each report together with a report of the tear-down inspection, full throttle power curve, day-to-day notes, comments, conclusions and recommendations.

The comments might be that the engine started promptly at all times; and that the idling and acceleration characteristics were very satisfactory. They might also state that when the engine was torn down after test a corner of a magneto coupling was found broken, but that aside from this failure the engine was found in excellent mechanical condition. The conclusion might be limited simply to the statement that the damaged magneto coupling appeared to be due to improper heat treatment.

The recommendations might state only that the result of this test has shown that the engine as submitted is suitable for approval with a rating of 100 horsepower at 2,000 revolutions per minute; and that this approval covers the operation of the engine on fuels equal or superior in antiknock value to that used during the test and is subject to meeting successfully the Department's flight test requirements.

The report of tear-down inspection includes detailed measurements for all main journals; of crank pins on all cylinders; of all main bearings; of all connecting rod bearings; of the piston pins and bushings; of the top and bottom skirt cylinder dimensions (including maximum out of round and maximum taper); of piston dimensions (thrust and ninety degrees to thrust); of top and bottom skirt piston clearance; of intake and exhaust valve leakage; and remarks as to the condition of thrust bearing: cylinders, pistons, spark plugs, rocker arms, magnetos, camshaft bearings and gears, carburetor, and miscellaneous items.

The importance of this work which is being conducted by the Department of Commerce is attested by the fact that less than fifty per cent of the engines so far tested have successfully passed the Government's requirements on the first trial. This shows conclusively the necessity of conducting type tests before authorizing the use of new types of engines in licensed aircraft. Each power plant is considered on its own merits and there are no standard requirements as to weight per horsepower or fuel or oil consumption per horsepower hour. Sound design, adequate materials, good workmanship, and reliable performance of the engine and its accessories are required.

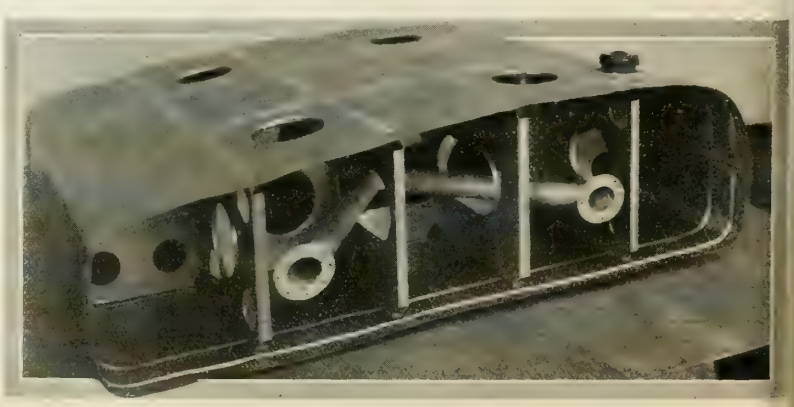
During the past two years the testing of commercial aircraft engine types to determine their suitability for use in licensed aircraft has been carried on very actively. Tests were made on forty-six engines, of which number twenty failed, five were withdrawn, three are still under test, and twenty-three have been approved or recommended for approval. Of the twenty unsuccessful engines, only fourteen completed half of the endurance test, and five failed in the first period. Seven engines have already passed the test after an initial failure.

TERNEPLATE TANKS USED ON THE ODGEN OSPREY

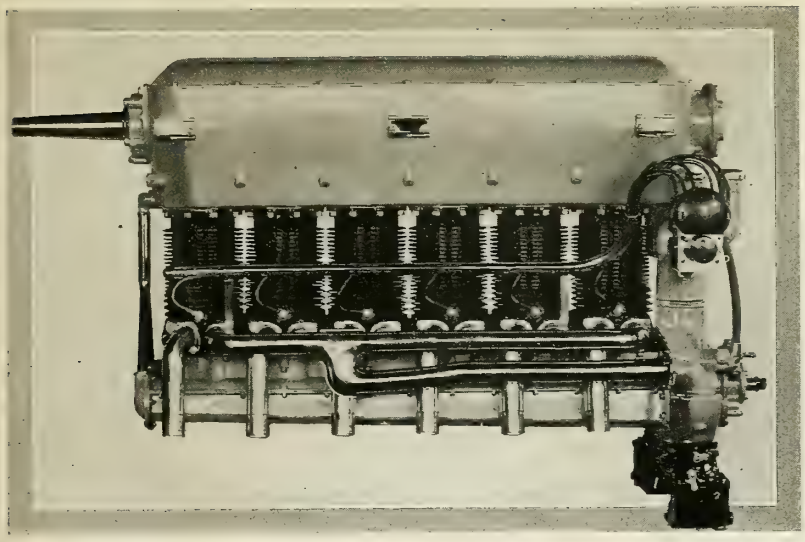
IN ORDER to overcome difficulties arising in connection with the use of aluminum fuel tanks, the Ogden Aeronautical Corporation of Inglewood, California, has designed and built a terneplate tank which is light in weight and is also strong. It has the added advantage of being cheap to build and can be repaired by practically any one capable of using properly a soldering iron.

The construction of the Ogden tank is interesting in that the shell is crimped to strengthen the terneplate which is .018 inch in thickness. Internally, the tank conforms to standard practices, using conventional baffles of .032 hard dural riveted together and to the shell, and arranged so as to carry the loads to the tank support points without exceeding the allowable stresses in the tank materials. All seams are soldered.

The absolute capacity of the tank is 48.2 gallons, with a weight empty of 32 pounds, which gives .664 pound of tank weight for each gallon capacity. Two such tanks are carried in the trimotored Ogden Osprey.



The Ogden terneplate gasoline tank with end removed



CHEVOLAIR ENGINE

FIRST formal exhibition of the Chevolair aircraft engine was held at the All-American Aircraft Show, Detroit, Mich., April 5-13. There are two models of this engine, a four-cylinder and a six-cylinder. Both are inverted, in-line, air-cooled aircraft power plants produced by Chevolair Motors, Inc., of Indianapolis, Ind., and designed to overcome failure in the air resulting from ignition, fuel line and valve trouble. Approved Type Certificate 35 has been issued for Model D-4, the four-cylinder engine, and application to the Department of Commerce for an Approved Type Certificate for Model D-6, the six-cylinder engine, has been made by the Chevolair company.

The Chevolair engine was designed by Mr. Chevrolet after an extensive survey in which he collected data on the causes of engine failure in the air. Since the factor contributing greatest to such failure was found to be ignition trouble, this engine has been designed with dual ignition systems either of which will continue the operation of the engine in the event of failure of the other. Because the next most frequent cause of failure was believed to result from trouble with the gas line, the Chevolair has been provided with two carburetors, each with a separate gas line to reduce the possibility of a forced landing resulting from a clogged or broken gas line.

Breakage of oil lines was found to be frequent cause of such failure, and the oil lines of the Chevolair are drilled in the crankcase to reduce the possibility of engine failure resulting from oil line breakage. An exhaust and intake valve, each on opposite sides of the engine and operated by separate camshafts on either side of the valves, are installed on the Chevolair to eliminate the possibility of broken and warped valves, a frequent contributing factor in engine failure while a plane is in the air.

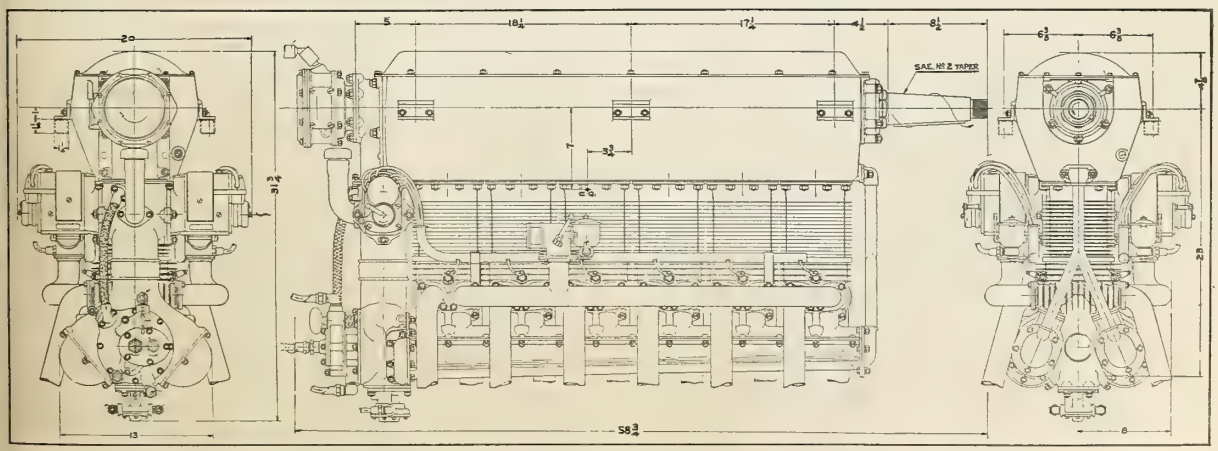
The six-cylinder Chevolair develops 170 horsepower at 2,400 revolutions per minute; weighs 425 pounds dry; has a piston displacement of 529 cubic inches; gas consumption of .57 pounds per horsepower hour; oil consumption of .03 pounds per horsepower hour. The crankshaft has seven main bearings of chrome-molybdenum steel, three inches in diameter, bored out. The four-cylinder Chevolair develops 110 horsepower at 2,250 revolutions per minute; weighs 345 pounds dry; has a displacement of 352 cubic inches; gas consumption of .56 pounds per horsepower hour; oil consumption of .03 pounds per horsepower hour. The crankshaft has five main bearings of chrome-molybdenum steel, three inches in diameter, bored out.

Both the four-cylinder and the six-cylinder engines have steel barrel cylinders of aluminum alloy, the head screwed and shrunk on; the connecting rods are star beam section chrome nickle steel forgings, the big end with a 2½-inch bearing, the small end with a 1⅛-inch pin; two overhead camshafts operating directly over the valves; two exhaust valves per cylinder, of the tulip type, one on each side; two flat-shape intake valves per cylinder, one on each side; two Robert Bosch magnetos; two Stromberg carburetors; lubrication system of the force and feed type using gear pump, all passages being drilled or cored in with emergency valve to convert system from dry sump to wet sump; and starter and fuel pumps are optional.

WIND TUNNEL TESTS ON METAL PROPELLERS

N. A. C. A. Report 340 by Fred E. Weick gives the full-scale aerodynamic characteristics of five different aluminum alloy propellers having four different blade forms. They were tested on an open-cockpit fuselage with a radial air-cooled engine having conventional cowling, in the twenty-foot Propeller Research Tunnel of the National Advisory Committee for Aeronautics, at Langley Field, Va. The results show that (1) the differences in propulsive efficiency due to the difference in blade form were small; (2) the form with the thinnest airfoil sections had the highest efficiency; (3) it is advantageous as regards propulsive efficiency for a propeller operating in front of a body, such as a radial engine, to have its pitch reduced toward the hub.

Report 340 may be obtained upon request from the National Advisory Committee for Aeronuatics, Washington, D. C.



Installation drawings of the 170-horsepower six-cylinder Chevolair inverted aircraft engine

COMMERICAL AND PRIVATE AIRPLANES

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GROUPED FOR CONVENIENCE IN MAKING COMPARISONS

	Seating Capacity Incl. Pilot	Open or Closed	Monoplane or Biplane	Land, Water, or Amphibian	NAME AND ADDRESS OF MANUFACTURER		MODEL DESIGNATION	ATC No.	POWER PLANT			Fuel Capacity Gals.	WEIGHTS			Power Loading Lbs./H.P	Surface Loading Lbs./Sq. Ft.
									Total Rated H.P.	ENGINE MAKE AND MODEL			Airplane Gross Lbs.	Airplane Net Lbs	Disposable Load Lbs.		
MAIL-EXPRESS	1 (2)	O	M	L	Aeronautical Corp. of Amer.	Cincinnati, Ohio	Aeronca C-2		30	Aeronautical Corp.	E-107	5	700	380	320	23 00	4 92
	1	O	M	L	Heath, Airplane Co.	Chicago, Ill.	Super Parasol		27	Heath	Henderson	5	590	300	290	21 00	5 10
	1	O	M	L	Szekely Aircraft & Eng. Co.	Holland, Mich.	Flying Dutchman		40	Szekley	SR-3	10	800	570	230	20 00	7 4
	1	O	M	L	Travel Air Co.	Wichita, Kan.	S		300	Wright	R-975	42	1940	1475	465	6 46	5 5
	1	O	B	L	Boeing Airplane Co.	Seattle, Wash.	100	133	450	Pratt & Whitney	Wasp	95	2690	1882	817	6 35	1 85
	1	O	B	L	Stearman Aircraft Corp.	Wichita, Kan.	Speedmail	202	450	Pratt & Whitney	Wasp	100					
	1	O	M	L	Fokker Aircraft Corp.	Hackensack, N. J.	F-VII	234	525	Pratt & Whitney	Hornet	180	7200	4245	2955	13 70	13 10
	1	O	M	L	General Airplanes Corp.	Buffalo, N. Y.	Mail Plane		525	Pratt & Whitney	Hornet-G	130	6250	3182	3068	11 9	13 80
	1	O	B	L	Pitcairn Aircraft, Inc.	Willow Grove, Pa.	Mailwing		220	Wright	J-5	60	2512	1612	770	11 40	9 96
	1	O	B	L	Curtiss Aeroplane & Motor Co.	Garden City, N. Y.	Carrier Pigeon II	237	600	Curtiss	Conqueror-C	175	7600	4210	3390	12 66	13 37
CLUBS	2	O	M	L	Davis Aircraft Corp.	Richmond, Ind.	D-1	256	65	Le Blond	5-D	20	1334	839	495	20 8	9 20
	2	O	M	L	Davis Aircraft Corp.	Richmond, Ind.	D-1-K	272	90	Kinner	K-5	25	1461	925	536	16 25	10 08
	2	O	M	L	Doyle Aero Corp.	Baltimore, Md.	02	247	65	Le Blond	5-D	25	1321	792	529	20 35	8 00
	2	O	M	L	Golden Eagle Aircraft Corp.	Columbus, Ohio	Chief	202	90	Le Blond	7-D	25	1479	966	513	16 45	8 97
	2	O	M	L	General Airplanes Corp.	Buffalo, N. Y.	Cadet III-C	229	110	Warner	Scarab	20	1741	1206	535	15 83	8 62
	2	O	M	L	Aeromarine Klemm Corp.	New York, N. Y.	AKL-26	203	65	Le Blond	5-D	30	1440	940	500	22 18	6 85
	2	O	M	L	Aeromarine Klemm Corp.	New York, N. Y.	AKL-26A	204	65	Le Blond	5-D	30	1530	954	576	23 56	7 3
	2	O	M	L	Aeromarine Klemm Corp.	New York, N. Y.	AKL-25	121	40	Salmson	AD-9	15	1325	815	510	33 12	6 3
	2	O	M	L	Emsco Aircraft Co.	Downey, Cal.	Cirrus		95	American Cirrus	Mark III	30	1045	1090	555	17 30	7 83
	2	O	M	L	Mohawk Aircraft Corp.	Minneapolis, Minn.	M-I-C	263	90	Kinner	K-5	37	1800	1142	658	20 00	2 40
	2	O	M	L	Mohawk Aircraft Corp.	Minneapolis, Minn.	M-I-C	297	110	Warner	Scarab	37	1782	1124	658	16 20	2 30
	2	O	M	L	Gates Aircraft Corp.	New York, N. Y.	R. S. V.		100	Renard	5 Cyl.	28	1604	1114	490	16 04	8 02
	2	O	M	L	Watkins Aircraft Co.	Wichita, Kan.	Skylark		65	Le Blond	5-D	20	1350	885	465	20 80	7 7
	2	O	M	L	Lockheed Aircraft Corp.	Burbank, Cal.	Sirius	300	425	Pratt & Whitney	Wasp	150	5200	2780	2420	12 38	9 62
	2	O	M	L	Mercury Aircraft, Inc.	Hammondsport, N. Y.	T-2	235	90	Le Blond	7-D	28	1513	935	578	16 83	7 90
	2	O	B	L	Gates Aircraft Corp.	New York, N. Y.	R. S. V.		100	Renard	5 Cyl.	28					
	2	O	B	L	Montadsville Aircraft Corp.	Pittsburgh, Pa.	Lone Eagle		55	Michigan Aero	Rover	25	1300	800	500	20 00	6 25
	2	O	B	L	Dreyer Aircraft Corp.	Lansing, Mich.	Skylark		55	Michigan Aero	Rover	18	1370	878	492	24 9	7 4
	2	O	B	L	Great Lakes Aircraft Corp.	Cleveland, Ohio	2T-1A	238	90	American Cirrus	Mark III	25	1580	1082	578	17 55	8 42
	2	O	B	L	Warrior Aircraft Corp.	Alliance, Ohio	Arzo	178	125	Warrior	Hess	35	1615	1077	538	14 04	7 95
	2	O	B	L	Whittelsey Mfg. Corp.	Bridgeport, Conn.	Avian		90	American Cirrus	Mark III	24	1600	875	725	17 77	6 6
	2	O	B	L	Moth Aircraft Corp.	St. Louis, Mo.	D. H. Gypsy	197	90	Wright	Gypsy	23	1650	1027	623	16 5	6 78
	2	O	B	L	American Eagle Aircraft Corp.	Kansas City, Mo.			90	Kinner	K-5						
	2	O	B	L	Verville Aircraft Corp.	Detroit, Mich.	Sport Trainer										
	2	O	B	L	Timm Aircraft Corp.	Glendale, Cal.	Collegiate	180	90	Kinner	K-5	52	1952	1309	643	21 7	8 28
	2	O	B	L	Lincoln Aircraft Corp.	Lincoln, Neb.	PTW	284	110	Warner	Scarab	28 5	1794	1203	591	16 3	6 04
	2	O	B	L	Lincoln Aircraft Corp.	Lincoln, Neb.	PTK	279	90	Kinner	K-5	28 5	1767	1176	591	19 65	5 95
	2	O	B	L	New Standard Aircraft Corp.	Paterson, N. J.	D-29-A	216	90	Kinner	K-5	24	1610	1075	535	17 90	6 60
	2	O	B	L	New Standard Aircraft Corp.	Paterson, N. J.	D-29	198	90	American Cirrus	Mark III	24	1632	1097	535	18 15	6 66
	2	O	B	L	Crown Airplane Corp.	Los Angeles, Cal.	B-3	199	90	Kinner	K-5	25	1756	1243	513	19 50	7 78
	2	O	B	L	Swift Aircraft Co.	Wichita, Kan.			90	Curtiss	OX-5	41	2045	1370	675	22 75	7 04
	2	O	B	L	Command Aire, Inc.	Little Rock, Ark.	3C-3B	209	113	Siemens-Halske		48	2022	1340	682	17 90	6 68
	2	O	B	L	Travel Air Co.	Wichita, Kan.			165	Wright	R-540						
	2	O	B	L	Parks Aircraft Corp.	St. Louis, Mo.	P-1		90	Curtiss	OX-5	32	2078	1311	767	23 09	7 16
	2	O	B	L	Fairchild Airplane Mfg. Corp.	Farmingdale, N. Y.	KR-21	215	90	Kinner	K-5	23	1550	1015	535	17 25	8 02
	2	O	B	L	Chance Vought Corp.	Long Island City, N. Y.	Corsair		450	Pratt & Whitney	Wasp	110	4200	2250	1950	9 5	13 0
	2	O	B	L	Swallow Airplane Co.	Wichita, Kan.	TPW	253	110	Warner	Scarab	28	1730	1201	538	15 8	5 88
	2	O	B	L	Fleet Aircraft, Inc.	Buffalo, N. Y.	Fleet	131	90	Kinner	K-5	50	1675	976	699	16 75	5 58
	2	O	B	L	Fleet Aircraft, Inc.	Buffalo, N. Y.	Fleet-1	122	110	Warner	Scarab	50	1580	1022	558	14 38	5 11
	2	O	B	L	Curtiss Aeroplane & Motor Co.	Garden City, N. Y.	Fledgling	191	170	Curtiss	Challenger	40	2686	1990	696	15 82	7 37
	2	O	B	L	Curtiss Aeroplane & Motor Co.	Garden City, N. Y.	Fledgling J-1	266	165	Wright	R-540	40	2700	2009	691	16 37	7 42
	2	O	B	L	Curtiss Aeroplane & Motor Co.	Garden City, N. Y.	Fledgling J-2	269	225	Wright	R-760	40	3005	2117	888	13 35	8 26
	2	C	M	L	Berliner Joyce Aircraft Corp.	Baltimore, Md.	B J		90	American Cirrus	Mark III	30	1700	1131	569	18 90	8 25
AIRSTERS	2	O	M	L	Simplex Aircraft Corp.	Defiance, Ohio	Red Arrow	43	90	Kinner	K-5	40	1592	1020	572	17 70	9 95
	2	O	M	L	Simplex Aircraft Corp.	Defiance, Ohio	W-2-S	238	110	Warner	Scarab	40	1779	1152	627	16 20	11 12
	2	O	M	L	Mono Aircraft Corp.	Moline, Ill.	Mono Prep	218	55	Velie	M-5	15	1288	783	505	23 41	9 0
	2	O	M	L	Inland Aircraft Corp.	Kansas City, Kan.	Sport	259	65	Le Blond	5-D		1290	768	524	19 85	
	2	O	B	L	Arrow Aircraft & Motors Corp.	Havelock, Neb.	Pursuit		90	Kinner	K-5		1550	995	555	15 5	8 2
	2	O	B	L	Arrow Aircraft & Motors Corp.	Havelock, Neb.	Sport	215	65	Le Blond	5-D	16	1270	811	459	19 55	7 15
	2	O	M	SH	Ireland Aircraft, Inc	Garden City, N. Y.	Privateer										
COUPES	2	C	M	L	St. Louis Aircraft Corp.	St. Louis, Mo.	C-2-90	264	90	Le Blond	7-D	27	1523	995	528	16 92	9 52
	2	C	M	L	St. Louis Aircraft Corp.	St. Louis, Mo.	C-2-110	277	90	Kinner	K-5	27	1525	1002	523	16 95	9 52
	2	C	M	L	St. Louis Aircraft Corp.	St. Louis, Mo.	Cardinal C-2	273	65	Le Blond	5-D	25	1450	929	521	22 22	9 06
	2	C	M	L	Simplex Aircraft Corp.	Defiance, Ohio	Red Arrow	44	90	Kinner	K-5		1592	1020	572	17 70	9 96
	2	C	M	L	Star Aircraft Corp.	Bartlesville, Okla.	Cavalier-C	255	65	Le Blond	5-D	26	1400	861	539	21 5	9 8
	2	C	M	L	Kari-Keen Aircraft, Inc.	Sioux City, Iowa	Coupe		55	Velie	M-5	18	1400	833	567	28 0	9 55
	2	C	M	L	La Salle Aircraft Corp.	Joliet, Ill.	Coupe		65	Le Blond	5-D	22	1345	880	465	20 7	8 68
	2	C	M	L	Mono Aircraft Co.	Moline, Ill.	Monosport 1	249	110	Warner	Scarab	32	1650	1056	594	15 00	12 4
	2	C	M	L	Mono Aircraft Co.	Moline, Ill.	Monosport 2	250	90	Kinner	K-5	32	1650	1053	597	18 35	12 5
	2	C	M	L	Mono Aircraft Co.	Moline, Ill.	Monocoupe	113	55	Velie	M-5	25	1350	848	502	24 5	9 44
UNIVERSALS	3	O	M	L	Moreland Aircraft, Inc.	Inglewood, Cal.	M-1	241	220	Wright	J-5	50	2800	2000	800	12 5	10 8
	3	O	M	L	Nicholas-Beazley Airplane Corp	Marshall, Mo.	NB-36	231	80	Genet		18	1364	735	629	17 05	8 5
	3	O	B	L	E. M. Laird Airplane Corp.	Chicago, Ill.	LCR-300	176	300	Wright	R-975	78	3010	1922	1088	10 0	4 9
	3	O	B	L	Alexander Aircraft Corp.	Colorado Springs, Colo.	A-13	141	170	Curtiss	Challenger	59	2650	1705	945	14 49	7 89
	3	O	B	L	Alexander Aircraft Corp.	Colorado Springs, Colo.	A-12	139	130	Comet		59	2580	1627	953	17 2	7 83
	3	O	B	L	Alexander Aircraft Corp.	Colorado Springs, Colo.	A-15	190	90	Kinner	K-5	39	2261	1423	838	24 56	7 45
	3	O	B	L	New Standard Aircraft Corp.	Paterson, N. J.	D-26-A	225	225	Wright	R-760	64	3400	2055	1345	15 11	9 73
	3	O	B	L	Butler Air craft Corp.	Kansas City, Mo.	Blackhawk	135	220	Wright	J-5	82	2900	1885	1015	13 20	9 35
	3	O	B	L	Brunner-Winkle Aircraft Corp.	Brooklyn, N. Y.	Bird	239	90	Kinner	K-5	35	1980	1199	781	22 00	7 45
	3	O	B	L	Bird-Wing Com'l Aircraft Co.	St. Joseph, Mo.	Imperial	Yes	165	Wright	R-540	40	2270	1440	830	13 75	7 46
	3	O	B	L	Command-Aire, Inc.	Little Rock, Ark.			210	Lycoming		55					
	3	O	B	L	Command-Aire, Inc.	Little Rock, Ark.	3C-3C	233	165	Wright	R-540	55	2490	1559	931	15 10	8 23
	3	O	B	L	Command-Aire, Inc.	Little Rock, Ark.	3C-3B	214	115	Axelson		55	2372	1503	869	20 60	8 40
	3	O	B	L	Stearman Aircraft Corp.	Wichita, Kan.	C-3-R	251	225	Wright	R-760	55	2700	1741	959	12 00	9 10
	3	O	B	L	Spartan Aircraft Corp.	Tulsa, Okla.	C-3-166	290	165	Comet		65	2605	1617	988	15 80	8 90
	3	O	B	L	Spartan Aircraft Corp.	Tulsa, Okla.	C-3-225	286	225	Wright	R-760	65	2700	1741	959	12 00	9 30
	3	O	B	L	Spartan Aircraft Corp.	Tulsa, Okla.	C-3-165	195	165	Wright	R-540	65	2585	1617	968	15 65	8 88
	3	O	B	L	Travel Air Co.	Wichita, Kan.	K-4000	205	90	Kinner	K-5	42	2280	1340	940	25 35	7 7
	3	O	B	L	Travel Air Co.	Wichita, Kan.	4-P	280	140	A. C. E.	LA-1	42	2388	1531	857	17 05	8 07
	3	O	B	L	Travel Air Co.	Wichita, Kan.	4-D	254	225	Wright	R-760	67	2880	1837	1043	12 80	9 74
	3	O	B	L	Parks Aircraft Corp.	Detroit, Mich.	P-2-A	276	165	Wright	R-540	50	2380	1483	897	14 42	8 35
	3	O	B	L	Swallow Aircraft Corp.	Wichita, Kan.	F-28-AX	125	115	Axelson		62	2497	1574	923	16.7	8 3
	3	O	B	L	Waco Aircraft Corp.	Troy, Ohio	CS-225	240	225	Wright	R-760	76	2600	1628	972	13 0	9 03
	3	O	B	L	Waco Aircraft Corp.	Troy, Ohio	BS-165	168	165	Wright	R-540	65	2600	1563	1027	15.75	9 03

ME = Mail and Express. H = Hull. P = Pontoon. WD = Wood. AL = Aluminum Alloy. ST = Steel. TU = Tube. CL = Cloth. PLWD = Plywood.

MANUFACTURED IN THE UNITED STATES

ACCORDING TO PASSENGER CAPACITIES AND TYPE

Prepared especially for Aero Digest by D. W. Huntington

GENERAL DIMENSIONS			WINGS			FUSELAGE OR HULL		UNDERCARRIAGE				PERFORMANCE—Full Load at Sea Level				
Span Over All	Length Over All	Height Over All Tail High	Area (Including Ailerons) Sq. Ft.	Structure	Covering	Structure	Covering	Type	Brakes	Shock Absorber	Structure	Landing Speed M.P.H.	Cruising Speed M.P.H.	Maximum Speed M.P.H.	Initial Climb Ft./Min.	Absolute Ceiling Feet
36′ 0″	20′ 0″	7′ 0″	142.5	WD	CL	ST TU	CL	2W-TS	NO		ST TU	31	60	80	650	20000
25′ 0″	17′ 0″	4′ 6″	110	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	32	65	70	500	12500
26′ 0″	18′ 2″	5′ 4″	108	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	30	80	90	600	11000
29′ 2″	20′ 2″	7′ 9″	125	WD	PLWD	ST TU	AL-PLWD	2W-TS	YES	OIL	ST TU	70	150	227	3200	31000
30′ 0″	30′ 1″	9′ 7″	227.5	WD	CL	AL TU	CL	2W-TS	YES	OIL	ST TU	56		165	2400	25000
38′ 0″	30′ 2″	9′ 10″	307	WD	CL	ST TU	CL	2W-TW	YES	HY-SP	ST TU	50	128	156		18000
59′ 0″	43′ 4″	12′ 11″	550	WD	PLWD	ST TU	CL	2W-TW	YES	R. CORD	ST TU	55	115	140	1200	20000
50′ 0″	35′ 2″	12′ 1″	453.6	WD-AL	CL	AL	AL	2W-TW	YES	OIL	ST TU	58	135	146	1025	17700
33′ 0″	22′ 10″	8′ 10″	252	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	45	105	136	1600	13000
47′ 6″	34′ 6.25″	13′ 4″	553		CL			2W-TS	YES	OIL	ST TU	65	122	151	850	13900
30′ 6″	19′ 8″	7′ 0″	145	WD-AL	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	38	85	101	700	10000
30′ 6″	19′ 8″	7′ 0″	145	WD-AL	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	40	105	125	1200	14000
30′ 0″	19′ 0″	7′ 11″	165	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	41	85	103	1000	19000
30′ 6″	21′ 0″	7′ 6″	165	WD	CL	ST TU	CL	2W-TS	NO	OIL	ST TU	32	108	126	1200	15000
36′ 4″	25′ 4.75″	8′ 4″	202	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	36	95	120	800	17000
40′ 2″	23′ 3″	6′ 6″	210	WD	PLWD	WD	PLWD	2W-TS	NO	R. CORD	ST TU					
40′ 2″	23′ 3″	6′ 6″	210	WD	PLWD	WD	PLWD	2W-TS	NO	R. CORD	ST TU	37	85	95	450	
40 2″	23′ 3″	6′ 6″	210	WD	PLWD	WD	PLWD	2W-TS	NO	R. CORD	ST TU	35	75	85	375	
35′ 0″	22′ 0″	7′ 0″	210	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	38	100	135		16000
34′ 11″	24′ 2.5″	7′ 7″	145	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	38	97	115	1100	19000
34′ 11″	24′ 2.5″	7′ 7″	145	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU					
31′ 3″	23′ 7″		200	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	40	90	112		16000
37′ 0″	23′ 5″	6′ 5″	175	WD	CL	ST TU	CL	2W-TS	NO		ST TU	35		103	725	16000
42′ 10″	27′ 6″	10′ 2″	265	WD	PLWD	WD	PLWD	2W-TS	YES	OIL	ST TU	60	140	175	1000	25000
35′ 8″	23′ 0″	8′ 10″	192	ST TU	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	42	90	115	900	17000
31′ 3″	23′ 7″		340	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	33	85	102		16000
28′ 6″	21′ 0″	8′ 0″	210	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	35	90	110	800	18000
28′ 3″	22′ 6″	8′ 3″	185	WD-AL	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	35	80	95	600	
26′ 8″	20′ 4″	7′ 9.5″	187	WD-AL	CL	ST TU	CL	2W-TS	YES		ST TU	35	100	116	1031	21000
28′ 8″	20′ 2″	9′ 1″	203	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	44	105	125	1050	16000
28′ 0″	24′ 0″	8′ 6″	243	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	35	85	102	750	18000
30′ 0″	23′ 11″	8′ 9″	243	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	40	90	105	700	22000
				WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU					
					CL	ST TU	CL	2W			ST TU					
35′ 0″	24′ 7″	8′ 5″	236	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	35	90	112		19000
32′ 3″	25′ 7″	9′ 3″	297	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	32	87	108	870	16000
32′ 3″	25′ 7″	9′ 3″	297	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	32	85	104	820	15000
30′ 0″	24′ 9″	9′ 0″	245	WD	CL	AL	CL	2W-TS	NO	OIL	ST TU	40	75	95	750	16000
30′ 0″		9′ 0″	245	WD	CL	AL	CL	2W-TS	NO	OIL	ST TU					
28′ 0″	21′ 6″	7′ 6″	226	WD	CL	WD	PLWD-CL	2W-TS	NO		ST TU	35	96	112	950	18000
33′ 0″	24′ 8″	9′ 11″	257	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	38	75	89	450	
31′ 6″	24′ 6″	8′ 4″	303	WD	CL	ST TU	CL	2W-TS	NO		ST TU	35	93	104	460	14000
				WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU					
30′ 1″	24′ 1″	9′ 4″	290	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	34	90	102	500	11000
27′ 0″	22′ 1″	9′ 0″	193	WD	CL	ST TU	CL	2W-TS	NO	R. DISC	ST TU		95	113	775	15000
36′ 0″	24′ 10″	10′ 0.5″	320	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	50	130	158	2200	23500
30′ 11′	23′ 9″	9′ 4″	296	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	38	80	100		
28′ 0	20′ 9″	7′ 10″	195	WD-AL	CL	ST TU	CL	2W-TS	NO	OIL	ST TU	44	90	113	930	15000
28′ 0″	20′ 9″	7′ 10″	195	WD-AL	CL	ST TU	CL	2W-TS	NO	OIL	ST TU					
39′ 5″	27′ 10.25″	10′ 4″	364	WD	CL	ST TU	CL	2W-TS	YES		ST TU	36	91	107	670	16600
39′ 5″	27′ 10.25″	10′ 4″	364	WD	CL	ST TU	CL	2W-TS	YES		ST TU					
39′ 5″	27′ 10.25″	10′ 4″	364	WD	CL	ST TU	CL	2W-TS	YES		ST TU					
38′ 0″	26 3″	7′ 9.5″	296	WD	CL	ST TU	CL	2W-TS	NO		ST TU	47	80	100	520	13000
34′ 4″	22′ 3″	7′ 0″	160	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	38	110	125	1000	14000
34′ 4″	22′ 3″	7′ 0″	160	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	38	110	125	1000	16000
32′ 0″	21′ 0″	6′ 3″	143	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	35	80	92	700	12000
31′ 6″				WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU					
25′ 10″	19′ 6″	7′ 5″	178	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	40	95	110	1200	15000
25′ 10″	19′ 6″	7′ 5″	178	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	33	80	95	1000	19000
32′ 4″	21′ 3″	7′ 0″	160	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	40	102	118	1000	16000
32′ 4″	21′ 3″	7′ 0″	160	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	39	110	125	1100	17500
32′ 4″	21′ 3″	7′ 0″	160	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	35	85	100	800	
34′ 4″	22′ 3″	7′ 0″	160	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	38	110	125	1000	14000
31′ 6″	19′ 8″	6′ 3″	157	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	38	90	106	650	12000
30′ 0″	22′ 9″	7′ 0″	150	WD	CL	ST TU	CL	2W-TS	NO	OIL	ST TU	45	80	100	680	13000
32′ 0″	21′ 6″	6′ 10″	155	WD	CL	ST TU	CL	2W-TS	NO	OIL	ST TU	38	85	110	800	15000
32′ 2.5″	21′ 5″	7′ 1″	132	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	42	110	125	1000	22000
32′ 2.5″	21′ 5″	1′ 1″	132	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	42	110	125	1000	20000
32′ 0″	19′ 9″	6′ 3″	143	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	37	85	98	600	12000
39′ 0″	28′ 6″	9′ 0″	260	WD	CL	ST TU	CL	2W-TW	YES	R. CORD	ST TU	48	105	130	1000	20000
32′ 9″	22′ 5″	7′ 3″	160	AL	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	35	95	110	800	21500
28′ 0″	22′ 9″	9′ 0″	202	WD	CL	AL	CL	2W-TS	YES	OIL	ST TU	60	130	165	1500	
36′ 8″	23′ 11″	9′ 10″	338	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	40	101	119	840	16000
36′ 8″	23′ 11″	9′ 10″	338	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	40	98	116	720	13000
36′ 8″	23′ 11″	9′ 10″	338	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	37	87	100	480	13000
45′ 0″	26′ 6″	10′ 2″	350	WD	CL	AL	CL	2W-TS	YES	OIL	ST TU	37	100	114	1200	24000
34′ 0″	21′ 6″	10′ 0″	310	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	42	112	138	1300	
34′ 0″	22′ 3″	8′ 0″	266	WD	CL	ST TU	CL	2W-TS	NO	OIL	ST TU	35	100	120	850	
31′ 4″	24′ 2″	8′ 7″	304	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	30	105	125	800	22000
31′ 6″	22′ 2″	8′ 4″	303	WD	CL	ST TU	CL	2W-TS	YES		ST TU					
31′ 6″	22′ 2″	8′ 4″	303	WD	CL	ST TU	CL	2W-TS	YES		ST TU	35	95	114	900	18000
31′ 6″	22′ 2″	8′ 4″	303	WD	CL	ST TU	CL	2W-TS	YES		ST TU	35	95	112	800	17500
35′ 0″	24′ 0″	9′ 0″	297	WD	CL	ST TU	CL	2W-TS	YES	R. Cord-Hy	ST TU	41	110	130	1000	19000
32′ 0″	23′ 4.375″	8′ 10″	291	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	49	92	115	800	12000
32′ 0″	23′ 2.375″	8′ 10″	291	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	49	110	131	1050	17500
32′ 0″	23′ 2″	8′ 10″	291	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	45	100	115	900	
34′ 8″	24′ 6″	8′ 11″	296	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	43	90	105	500	12000
34′ 8″		8′ 11″	296	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU					
30′ 5″	23′ 7″	8′ 6″	250	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	55	118	140	970	18000
30′ 0″	22′ 11″	9′ 3″	285	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	49	110	131	1050	17500
32′ 8″	23′ 5″	8′ 7″	300	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	38	90	110	750	15000
30′ 7″	22′ 6″	9′ 2.5″	288	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	42	105	128	1200	20000
30′ 7″	22′ 6″	9′ 0″	288	WD	CL	ST TU	CL	2 W-TS	YES	OIL	ST TU	44	100	120	700	20000

AVIATION GASOLINE

By EMY KAYE

Superintendent, Natural Gasoline Dept., Skelly Oil Co.

WHAT are the desirable characteristics of a satisfactory aircraft engine fuel? Such a fuel ought to afford the motor easy starting, quick acceleration, and the highest r.p.m.; and, more important than any of these, the fuel ought not to cause vapor-locking. Because airplane engines with higher compression ratios are being manufactured, the detonating characteristics (H. U. C.) assume increasing importance. Another consideration is weight in terms of horsepower, for the weight of the fuel is definitely associated with the useful load of the craft.

An airplane fuel is composed of a physical mixture of hydrocarbons, each possessing its own peculiar characteristics. The most volatile hydrocarbons found in motor fuel, propane and butane, are entirely absent or practically so. Not a trace of propane and only a negligible percentage (not more than one and one-half per cent) of butane may be found in the better airplane fuels. Even though butane would be highly desirable from the standpoint of easy starting, because it boils at approximately 33 degrees Fahrenheit, its presence in large percentages might cause vapor-lock or the sudden stoppage of flow of gasoline to the engine. Ease of starting *on the ground* is of secondary importance to *uninterrupted performance in the air.*

For easy starting, dependance is placed upon pentane, which boils at 80 degrees Fahrenheit. Pentane is more expensive than butane, but the diminution of the risk of premature volatilization of the fuel, with its incident perils, makes the cost well worth while. Hexane, heptaine and the heavier hydrocarbons of greater thermal value provide the "power" to the fuel. Hydrocarbon constituents, boiling at higher than 350 degrees Fahrenheit, are generally excluded, for there is always the danger that these fractions will not be completely evaporated and burned, and that his unburned part of the fuel in liquid form will find its way into the lubricating oil and impair the lubrication of the power unit.

Of some importance are several requirements of present specifications, which may be mentioned here. The gasoline should be doctor sweet, non-corrosive, and should not give an acid reaction. It is assumed that decidedly acid gasoline, corrosive, and (or) sour gasoline will cause undue wear and deterioration of the engine. Although there is considerable question as to the merits of these deductions as against the cost of eliminating these conditions in the fuel, specifications of today require that the fuel give negative reactions to doctor, corrosion and acid tests. The gasoline should also have good color, low gum content and be water free.

U. S. GOVERNMENT SPECIFICATIONS FOR AIRPLANE FUEL.

	Grades	
	Domestic	*Military*
Doctor	Negative	Negative
Color	Saybolt 25	Saybolt 25
Corrosion	Negative	Negative
Acidity of residue	None	None
Sulphur, not above	0.10%	0.10%
Gum	Not above 3 mgs.	Not above 3 mgs.
Distillation Range		
5 per cent	122/167	122/149
50 per cent	221	203
90 per cent	311	257
96 per cent	347	302
Endpoint	374	329
Recovery	96 per cent	96 per cent
Loss	2 per cent	2 per cent

Nature has provided the fuel to meet these requirements of aircraft. Although motor fuel and airplane fuel are refined or extracted from crude oil, a mass of mixed hydrocarbons—an ideal motor fuel—may be manufactured by the simple expediency of liquefying the *natural* gasoline vapors from natural or casinghead gas, and eliminating from the product of liquefaction the light fractions referred to above—propane, butane and ethane, if any of this gas is condensed. (Casinghead is a gas produced from an oil well along with crude oil.) Such a fuel is Skelly Aerodynamic Gasoline.

SKELLY AERODYNAMIC GASOLINE

Doctor	negative
Color	25 plus
Corrosion	none
Sulphur	none
Gum	none
Specific gravity	.696
A. P. I. gravity	71.80
R. P. M.	1200
B. H. P.	21.45
Fuel consumption	15.55 lbs. per hour
Fuel consumption, 6.28 lbs. per b.h.p. per hr.	
Distillation Range	
5 per cent	138
50 per cent	170
90 per cent	243
96 per cent	292
Endpoint	323
Recovery	98 per cent
Loss	1.3 per cent

In the production of crude petroleum from its oil wells, the company necessarily produces incident thereto millions of cubic feet of casinghead gas, which contains gasoline vapors. Some two hundred million cubic feet is so produced daily. The processing to which this gas (once aptly called "the aroma of crude oil") is subjected results in a yield of approximately 200,000 gallons of a so-called natural gasoline. When propane and butane, and iso-pentane, are removed from the natural gasoline, an excellent air fuel is produced.

When an oil well is drilled in, from 200 to 5,000 cubic feet of gas are produced with every barrel of oil. The gas in the oil-bearing formation is really dissolved in the oil and it propels the oil to the well bore and "lifts" the oil to the mouth of the well. There the oil and gas are separated. Although at one time this gas was used for fuel only, it has since been discovered that by its long and intimate contact with the oil, it absorbs considerable gasoline from the oil. The gas is, therefore, saved and is now conducted through large gas gathering systems to a central plant by means of suction pumps, through which the gas is compressed to approximately thirty-five pounds' pressure. The gas is then passed through suitable coolers, where the heat of compression is dissipated, and is ready for treatment by the absorbing medium.

The absorbing medium used is called mineral seal oil. It is a high-boiling point material cut out of crude oil. It boils at approximately 375-500 degrees Fahrenheit, and has final boiling points of 500-700 degrees Fahrenheit, according to the particular requirements of the gasoline manufacturer. This oil is then pumped into the top of an absorber *A* (see illustration), through which the cooled gas is passed up from the



Engine room and absorption units of Skelly plant where aviation gasoline is manufactured

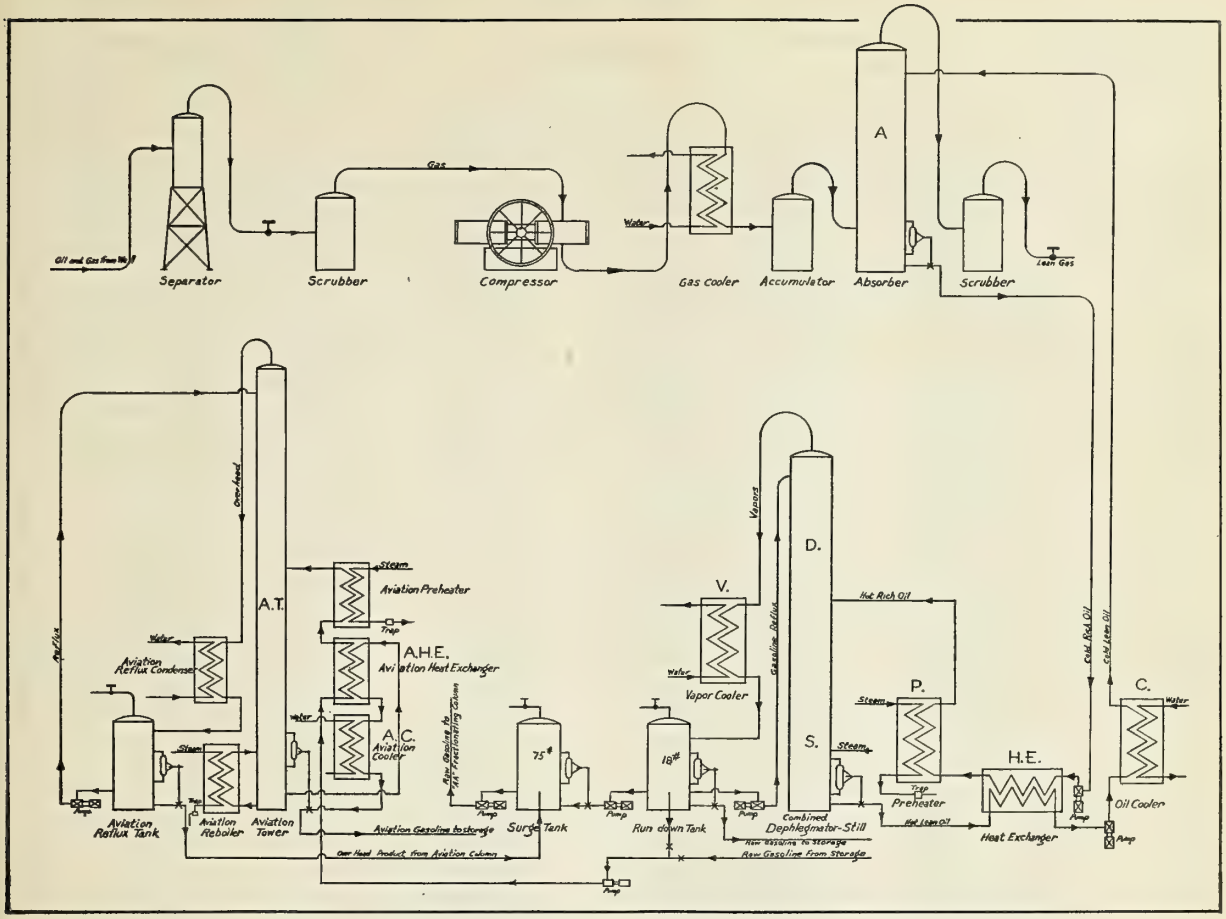


Diagram showing absorption plant processes in the refinement of gasoline for aviation use

bottom. By the time the oil has reached the bottom of the absorber, it has absorbed practically all of the desirable hydrocarbons from the gas. The gas leaves the absorber at the top and is used for such fuel requirements as there may be in the plant or on the lease.

The enriched oil is passed through heat exchanges *HE*, where it is heated by hot oil coming from the still *S* on its way to the coolers *C* and absorber for further absorption duty. The hot oil leaving the heat exchanges then enters a preheater *P*, where the temperature is raised to the point where all natural gasoline in the oil will be evaporated. The oil then enters the top of the bubble tower still *S*, where the vapors are "flashed" from the oil. As the oil flows down upon lower trays, it comes into contact with hot vapors liberated by live steam injected into the still near the bottom. The function of the steam is to lower the partial pressure in the still and hence accelerate the evaporation. The residue, or denuded oil, is discharged from the still into heat exchangers, and, as already mentioned, heats fat oil and is itself cooled before it reaches the oil coolers. This reciprocal work results in a saving of fuel, water and power.

The vapors from the still pass through a dephlegmator *D* wherein any heavy oil is dropped back, so that what goes by to the vapor coolers *V* is of a controlled endpoint. Skelly Aerodynamic at this stage of production has an endpoint of 300 degrees Fahrenheit. A low "residue" cannot be obtained in the final product unless the endpoint is here carefully controlled. Tests are constantly made on the stream to insure perfection in this respect.

The liquid condensate is now transferred for processing to a series of a high-pressure bubble tower *AT* for the elimination of the front end fractions, which are deemed too volatile for an airplane fuel. The gasoline enters the column through a heat exchanger *AHE* in order to be heated up toward the temperature maintained upon the column, and for the further purpose of cooling the rectified fuel, which is at column temperature, before it enters water coolers *AC* on its way to storage.

The heated gasoline enters the column at a point somewhat above the liquid level in the column, where a large proportion of the material is evaporated. The temperature necessary to evaporate the gasoline is maintained by a reboiler *AR* which is hung on the line, the heated material being circulated continuously. As the vapors that are released pass up toward the upper trays in the column, they meet down-coming hydrocarbons, which are refluxed for the purpose of recondensing such vapors as it is desired to keep in the base product. The reflux represents a portion of expelled vapors which were condensed and thrown back into the tower in order to make a temperature gradient to serve as a sieve and to hold back the wanted heavier vapors, and to allow to pass those vapors not wanted in the base product.

From the base of the tower, a continual stream of super-rectified gasoline is drawn off, first through the heat exchanger *AHE* as described, then through coolers *AC* on the way to temporary storage. The cooling is effected in order to hold down such evaporation as might otherwise result from releasing hot gasoline from high pressure to atmospheric pressure.

The gasoline is now thoroughly stripped of light hydrocarbons but still contains active sulphur compounds which are to be eliminated. This is done by bringing the material into intimate contact with a solution of sodium hypochlorite and a caustic wash. In Skelly plants, a second caustic wash is given to the gasoline, which is a straight water bath. The gasoline is thoroughly tested as to doctor, corrosion, etc., and unless unsatisfactory, is pumped to clean storage where such water as may have been absorbed by the gasoline is allowed to settle out. The storage tanks are periodically drained to eliminate such water as may have settled out.

As a further safeguard against the water hazard, outlet connections, through which gasoline is pumped to the loading rack for shipment, are located some nine inches from the bottom of the tank.

	Seating Capacity Incl. Pilot	Open or Closed	Monoplane or Biplane	Land, Water, or Amphibian	NAME AND ADDRESS OF MANUFACTURER		MODEL DESIGNATION	ATC No.	POWER PLANT: Total Rated H.P.	POWER PLANT: ENGINE MAKE AND MODEL		POWER PLANT: Fuel Capacity Gals.	WEIGHTS: Airplane Gross Lbs.	WEIGHTS: Airplane Net Lbs.	WEIGHTS: Disposable Load Lbs.	WEIGHTS: Power Loading Lbs./H.P.	WEIGHTS: Surface Loading Lbs./Sq. Ft.
UNIVERSALS	3	O	B	L	Waco Aircraft Corp.	Troy, Ohio	CT-225	257	225	Wright	R-760	100	2600	1677	923	13 0	11 45
	3	O	B	L	American Eagle Aircraft Corp.	Kansas City, Kan.	Phaeton	282	165	Wright	R-540	42	2560	1759	801	15 5	8 56
	3	O	B	L	American Eagle Aircraft Corp.	Kansas City, Kan.	201	293	90	Kinner	K-5	42	2020	1220	800	22 5	6 68
	3	O	B	L	American Eagle Aircraft Corp.	Kansas City, Kan.	Phaeton	283	220	Wright	J-5	42	2803	1896	907	12 75	9 38
	3	O	B	L	Pitcairn Aircraft, Inc.	Willow Grove, Pa.	Sport Mailwing PA-4	196	220	Wright	R-760	71	3020	1820	1200	13 59	12 5
	3	O	B	L	Fairchild Airplane Mfg. Corp.	Farmingdale, N. Y.	KR-34A	162	165	Wright	R-540	50	2342	1457	885	14 20	8 24
	3	O	B	L	Fairchild Airplane Mfg. Corp.	Farmingdale, N. Y.	KR-34	208	170	Curtiss	Challenger	50	2363	1463	900	13 15	8 31
	3	O	B	L	Rearwin Airplanes, Inc.	Kansas City, Kan.	Ken-Royce	232	170	Curtiss	Challenger	55	2380	1493	885	14 00	7 94
	3	O	B	L	Boeing Airplane Co.	Seattle, Wash.	203-A	211	165	Wright	R-540		2577	1789	788	15 60	
	3	O	B	L	Viking Flying Boat Co.	New Haven, Conn.	Bourdon B-4	166	90	Kinner	K-5	33	1875	1107	768	20 8	8 05
	3	O	B	AH	American Aeronautical Corp.	New York, N. Y.	Savoia S-56	287	90	Kinner	K-5	29	1750	1100	650	19 44	6 25
CABS	3	C	M	L	General Airplanes Corp.	Buffalo, N. Y.	102-A	117	110	Warner	Scarab	40	2110	1327	783	19 20	10 81
	3	C	M	L	General Airplanes Corp.	Buffalo, N. Y.	102-E	210	165	Wright	R-540	40	2300	1524	776	13 95	11 60
	3	C	M	L	Mohawk Aircraft Corp.	Minneapolis, Minn.	Redskin		110	Warner	Scarab	37					
	3	C	M	L	Curtiss-Robertson Airpl. Corp.	St. Louis, Mo.	Robin C-2	144	170	Curtiss	Challenger	50	2600	1667	933	15 30	10 70
	3	C	M	L	Curtiss-Robertson Airpl. Corp.	St. Louis, Mo.	Robin W	268	110	Warner	Scarab	50	2300	1520	780	20 9	9 48
	3	C	M	L	Curtiss-Robertson Airpl. Corp.	St. Louis, Mo.	Robin J2	221	165	Wright	R-540	50	2600	1565	1035	15.78	10 70
	3	C	B	L	Buhl Aircraft Corp.	Marysville, Mich.	CA-3-D	163	300	Wright	R-975	90	3200	2017	1183	10.68	13 33
TOURISTERS	4	O	B	SH	Rogers Aeronautical Mfg. Corp.	Mineola, N. Y.	RB-X	274	225	Wright	R-760	50	3430	2396	1034	15 25	9 06
	4	O	B	SH	Viking Flying Boat Co.	New Haven, Conn.	V-2		225	Wright	R-760	50	3300	2300	1000	15 00	7 40
	4	O	B	SH	Eastman Aircraft Corp.	Detroit, Mich.	E-2	288	180	Curtiss	Challenger	48	2725	1745	980	16 00	11 65
	4	O	B	AH	Eastman Aircraft Corp.	Detroit, Mich.	E-3		180	Curtiss	Challenger						
COACHES	4	C	M	L	Stinson Aircraft Corp.	Wayne, Mich.	SM-2A		225	Wright	R-760	70	3217	2091	1116	14 3	13 63
	4	C	M	L	Stinson Aircraft Corp.	Wayne, Mich.	SM-7A	298	300	Wright	R-975	70	3500	2234	1266	11 67	14 9
	4	C	M	L	Stinson Aircraft Corp.	Wayne, Mich.	SM-		210	Lycoming		70					
	4	C	M	L	Cessna Aircraft Corp.	Wichita, Kan.	DC-6-A	243	300	Wright	R-975	66	3180	1932	1248	10 6	11 87
	4	C	M	L	Cessna Aircraft Corp.	Wichita, Kan.	DC-6-B	244	225	Wright	R-760	66	3100	1871	1229	13 78	11 57
	4	C	M	L	Cessna Aircraft Corp.	Wichita, Kan.	DC-6	207	170	Curtiss	Challenger	66	2988	1767	1221	16 95	10 75
	4	C	M	L	Alexander Aircraft Corp.	Colorado Springs, Colo.	Bullet	Yes	90	Kinner	K-5	40	2293	1228	1065	25 4	11 3
	4	C	M	L	Bellanca Aircraft Corp.	New Castle, Del.	PM-300	245	300	Wright	R-975		4600	2290	2310	15 35	
	4	C	M	L	Invincible Metal Furniture Cor.	Manitowoc, Wisc.	Center-Wing		170	Curtiss	Challenger	60	2904	1740	1164	17 10	12 73
	4	C	M	L	Mono Aircraft Co.	Moline, Ill.	Monocoach-275	275	225	Wright	R-760	63	3100	1883	1217	13 07	14 06
	4	C	M	L	Ryan Aircraft Corp.	St. Louis, Mo.	Foursome C-1		225	Wright	R-760	75	3300	2000	1300	14 7	15.00
	4	C	M	L	Verville Aircraft Corp.	Detroit, Mich.	101	267	225	Wright	R-760		3400	2125	1275	15 11	12 36
	4	C	M	L	Fairchild Airplane Mfg. Corp.	Farmingdale, N. Y.	42	242	300	Wright	R-975	100	4300	2852	1448	14 33	14 80
	4	C	M	L	American Eagle Aircraft Corp.	Kansas City, Kan.	D-430		165	Wright	R-540	70	3000	1783	1217	18 20	12 70
	4	C	M	L	Travel Air Mfg. Corp.	Wichita, Kan.	10-D	278	225	Wright	R-760	70	3400	2130	1270	15 10	14 2
	4	C	M	L	Curtiss-Robertson Airpl. Corp.	St. Louis, Mo.	Robin 4-C	270	180	Curtiss	Challenger		2600	1676	924	14 44	10 70
	4	C	B	L	Paramount Aircraft Corp.	Saginaw, Mich.	Cabinaire	265	165	Wright	R-540	50	2630	1620	1010	16 00	8 50
	4	C	M	AH	Sikorsky Aviation Corp.	Bridgeport, Conn.	S-39		300	Pratt & Whitney	Wasp Jr.						
	4	C	B	AH	Keystone Aircraft Corp.	Bristol, Pa.	Loening Commuter	219	300	Wright	R-975	70	4000	2780	1220	13 33	10 28
	4	C	B	AH	Great Lakes Aircraft Corp.	Cleveland, Ohio			220	American Cirrus (2)	Hermes						
	1-M.E.	O	B	L	New Standard Aircraft Corp.	Paterson, N. J.	D-27-A	226	225	Wright	R-760	64	3400	2055	1345	15 10	9 72
	2	O	M	L	Courier Monoplane Co.	Long Beach, Cal.	Trainer		90	Kinner	K-5		1937	1227	700	21 52	9 35
	5	C	B	AH	Ireland Aircraft, Inc.	Garden City, N. Y.	N-2-C	248	450	Pratt & Whitney	Wasp	80	4860	3294	1566	10 80	12 92
	5	C	B	L	Boeing Airplane Co.	Seattle, Wash.	40-B-4	183	525	Pratt & Whitney	Hornet	140	6080	3809	2271	11 60	11 15
	5	O	B	L	New Standard Aircraft Corp.	Paterson, N. J.	D-25-A	224	225	Wright	R-760	64	3345	2053	1290	14 86	9 56
	5	C	B	L	Stearman Aircraft Corp.	Wichita, Kan.	LT-1	187	525	Pratt & Whitney	Hornet	146	6250	3890	2360	11 90	12 75
	5	C	M	L	Lockheed Aircraft Corp.	Burbank, Cal.	Air Express	102	420	Pratt & Whitney	Wasp	100	4375	2533	1842	10 42	15 20
	6	C	M	L	Lockheed Aircraft Corp.	Burbank, Cal.	Vega	169	420	Pratt & Whitney	Wasp	100	4033	2465	1568	9 60	14 66
	6	C	M	L	Curtiss Aeroplane & Motor Co.	Garden City, N. Y.	Thrush-J	160	170	Curtiss	Challenger	114	3700	2232	1468	21 76	12 13
	6	C	M	L	Curtiss Aeroplane & Motor Co.	Garden City, N. Y.	Thrush-J	261	225	Wright	R-760	110	3800	2260	1540	16 90	12 45
	6	C	M	L	Ogden Aeronautical Corp.	Inglewood, Cal.	Osprey		270	American Cirrus (3)	Mark III	50	4500	2800	1700	15 8	14 40
	6	C	M	L	Joseph Kreutzer Corp.	Los Angeles, Cal.	K-5	223	270	Kinner (3)	K-5	85	4443	2745	1698	16 4	14 10
	6	C	M	L	Joseph Kreutzer Corp.	Los Angeles, Cal.	K-3	170	270	Le Blond (3)	7-D	85	4500	2846	1654	16 7	14 30
	6	C	M	L	Ryan Aircraft Corp.	St. Louis, Mo.	B-7	262	420	Pratt & Whitney	Wasp	100	4283	2503	1780	10 2	15 6
	6	C	M	L	Ryan Aircraft Corp.	St. Louis, Mo.	B-5	142	300	Wright	R-975	100	4000	2251	1749	13 3	14 5
	6	C	M	L	Cessna Aircraft Corp.	Wichita, Kan.	CW-6		300	Wright	R-975	100	3950	2150	1800	13 17	13 35
	6	C	M	L	Stinson Aircraft Corp.	Wayne, Mich.	SM-1-F	136	300	Wright	R-975A	100	4300	2614	1684	14 35	14 72
	6	C	M	SP	Stinson Aircraft Corp.	Wayne, Mich.	SM-1-FS	212	300	Wright	R-975	100	4700	3198	1502	15 65	16 10
	6	C	B	L	Cunningham-Hall Airplane Co.	Rochester, N. Y.	PT-6	177	300	Wright	R-975	90	4350	2680	1670	13 5	11 70
	6	C	B	L	Buhl Aircraft Corp.	Marysville, Mich.	CA-6	128	300	Wright	R-975A	100	4200	2478	1722	14 0	13 34
	6	C	M	L	Travel Air Co.	Wichita, Kan.	S-6000-B	130	300	Wright	R-975	82	4230	2608	1622	14 10	15 10
	6	C	M	SP	Travel Air Co.	Wichita, Kan.	SA-6000-A	175	420	Pratt & Whitney	Wasp	130	5500	3576	1824	13 10	16 15
	6	C	M	L	Bellanca Aircraft Corp.	New Castle, Del.	CH-300	129	300	Wright	R-975	80	4075	2275	1800	13 58	12 72
	6	C	[redacted]	SH	Boeing Airplane Co.	Seattle, Wash.	204	157	450	Pratt & Whitney	Wasp	80	5000	3371	1629	11 10	11 62
	7	C	M	L	Lockheed Aircraft Corp.	Burbank, Cal.	Vega	227	450	Pratt & Whitney	Wasp	100	4265	2490	1775	9 5	15 51
	7	C	M	L	Lockheed Aircraft Corp.	Burbank, Cal.	Vega	252	300	Wright	R-975	100	4220	2305	1915	14 07	15 35
	7	C	M	L	Fokker Aircraft Corp.	Hackensack, N. J.	F-XIV	234	525	Pratt & Whitney	Hornet	180	7200	4346	2854	13.71	13 00
	7	C	M	L	Fokker Aircraft Corp.	Hackensack, N. J.	Std. Universal	164	300	Wright	R-975	78	4300	2482	1818	14 35	14 33
	7	C	M	L	Curtiss Aeropl. & Motor Corp.	Garden City, N. Y.	Kingbird		225	Wright (2)	R-760						
	7	C	M	L	Fairchild Airplane Mfg. Corp.	Farmingdale, N. Y.	71	89	420	Pratt & Whitney	Wasp	160	5500	2930	2570	13.75	16 57
	8	C	M	L	Fokker Aircraft Corp.	Hackensack, N. J.	Super-Universal	52	450	Pratt & Whitney	Wasp	126	5150	2950	2150	11.45	13 92
	8	C	M	L	Stinson Aircraft Corp.	Wayne, Mich.	SM-6B	217	420	Pratt & Whitney	Wasp	110	5350	3496	1854	12.72	16 00
	8	C	M	L	Emsco Aircraft Corp.	Downey, Cal.	B-3		300	Wright	R-975	130					
	8	C	M	L	Emsco Aircraft Corp.	Downey, Cal.	Challenger		510	Curtiss (3)	Challenger	130	5700	3362	1190	11 20	11 80
	8	C	M	L	Bellanca Aircraft Corp.	New Castle, Del.	CH	47	220	Wright	J-5	86	4050	2190	1860	18 41	18 40
	8	C	M	AH	Fokker Aircraft Corp.	Hackensack, N. J.	F-X1-A	222	525	Wright	Cyclone	126	6900	4470	2430	13.12	13.80
	8	C	B	AH	Keystone Aircraft Corp.	Bristol, Pa.	Loening CZ-C	90	525	Wright	Cyclone	140	6250	3894	2356	11 90	12 10
	8	C	M	L	Metal Aircraft Corp.	Cincinnati, Ohio	Flamingo G-2-W	192	450	Pratt & Whitney	Wasp	150	5800	3370	2430	12 90	15 9
	8	C	B	L	Buhl Aircraft Corp.	Marysville, Mich.	CA-8B	99	525	Pratt & Whitney	Hornet	181	6100	3542	2558	11 60	13 20
	8	C	M	L	Hamilton Aircraft Corp.	Wichita, Kan.	H-47	94	525	Pratt & Whitney	Hornet	140	5750	3699	2051	10 95	14 8
	8	C	M	L	Consolidated Aircraft Corp.	Buffalo, N. Y.	Fleetster		525	Pratt & Whitney	Hornet	150	5300	3182	2118	9 2	16 9
	10	C	M	L	Bach Aircraft Corp.	Van Nuys, Cal.	3-CT-8	172	855	(1) P & W 525; (2) WR-165		125	7980	4785	3195	9 34	15.7
	10	C	M	L	Bach Aircraft Corp.	Van Nuys, Cal.	3-CT-9	271	900	(1) P & W 450; (2) WR-225		125	8000	5010	2990	8 90	16 32
	10	C	M	L	Stinson Aircraft Corp.	Wayne, Mich.			630	Lycoming (3)							
	12	C	M	L	Bellanca Aircraft Corp.	New Castle, Del.											
	12	C	B	SH	Sikorsky Aviation Corp.	Bridgeport, Conn.	S-38-B	158	900	Pratt & Whitney (2)	Wasp	330	10480	6460	4020	12 8	14 5
	14	C	M	L	Fokker Aircraft Corp.	Hackensack, N. J.	FX-A	96	1350	Pratt & Whitney (3)	Wasp	370	13100	7780	5320	9 70	15 40
	14	C	M	L	Stout Metal Airplane Co.	Dearborn, Mich.	Stout-4-AT-E	132	900	Wright (3)	R-975A	231	10130	6696	3434	11 25	12 90
	15	C	M	L	Stout Metal Airplane Co.	Dearborn, Mich.	Stout-6-AT	173	900	Wright (3)	R-975		12144	7048	5096	13.50	14.60
	15	C	M	L	Stout Metal Airplane Co.	Dearborn, Mich.	Stout-7-AT	246	1050	(1) P & W 450 (2) WR-300(3)		281	12910	7280	5630	12 59	15 46
	16	C	M	SH	American Aeronautical Corp.	New York, N. Y.	Savoia S-55		1000	Isotta-Fraschini (2)		370	16100	10600	5500	16 10	13 4
	17	C	M	L	Stout Metal Airplane Co.	Dearborn, Mich.	Stout-5-AT-C	165	1350	Pratt & Whitney (3)	Wasp	277	13500	7500	6000	10 60	16 10
	20	C	B	L	Boeing Airplane Co.	Seattle, Wash.	80-A	206	1575	Pratt & Whitney (3)	Hornet	400	17500	10582	6918	11 10	14 00
	20	C	M	L	Upperecu-Burnelli Corp.	Keyport, N. J.	CB-3		1200	Curtiss (2)	Conqueror	750	15200	8520	6680	12 15	14 3
	22	C	B	L	Curtiss Aeroplane & Motor Co.	Garden City, N. Y.	Condor-CO	193	1200	Curtiss (2)	Conqer.-G	444	17900	11574	6326	14 92	11 5
	21	C	M	L	Keystone Aircraft Corp.	Bristol, Pa.	Patrician K-78-D	260	1575	Wright (3)	Cyclone	420	16000	10224	5776	10 16	17 25
	25	C	M	SH	Consolidated Aircraft Corp.	Buffalo, N. Y.	Commodore	258	1150	Pratt & Whitney (2)	Hornet-B	600	17600	9620	7980	15 33	15 85
	32	C	M	L	Fokker Aircraft Corp.	Hackensack, N. J.	F-32	281	2300	Pratt & Whitney (4)	Hornet-B	400	22500	14206	8294	9 78	16 67

ME = Mail and Express. H = Hull. P = Pontoon. WD = Wood. AL = Aluminum Alloy. ST = Steel. TU = Tube. CL = Cloth. PLWD = Plywood.

GENERAL DIMENSIONS			WINGS			FUSELAGE OR HULL		UNDERCARRIAGE				PERFORMANCE—Full Load at Sea Level				
Span Over All	Length Over All	Height Over All Tail High	Area (Including Ailerons Sq. Ft.	Structure	Covering	Structure	Covering	Type	Brakes	Shock Absorber	Structure	Landing Speed M.P.H.	Cruising Speed M.P.H.	Maximum Speed M.P.H.	Initial Climb Ft./Min.	Absolute Ceiling Feet
30′ 3″	22′ 6″	9′ 0″	227	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	48	112	137	1500	20000
31′ 0″	23′ 6″	9′ 5 5″	299	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	35	112	135	816	22500
30′ 6″	24′ 6″	8′ 0 5″	303	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	30	115	130	900	16000
31′ 0″	23′ 6″	9′ 5 5″	299	WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	40	120	142	1200	24000
33′ 0″	23′ 9″	9′ 6 5″	243	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	57	125	145		
30′ 0″	23′ 5″	9′ 3″	285	WD	CL	ST TU	CL	2W-TS	YES	R. DISC	ST TU			123	800	14100
30′ 0″	23′ 5″	9′ 3″	285	WD	CL	ST TU	CL	2W-TS	YES	R. DISC	ST TU					
35′ 0″	25′ 0″	9′ 11″	300	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	45	110	130	1000	24000
				WD	CL	ST TU	CL	2W-TS	YES		ST TU					
28′ 0″	22′ 11″	8′ 8″	233	WD	CL	ST TU	CL	2W-TS	NO	R. CORD	ST TU	40	90	110	1200	
34′ 1.5″	25′ 8″	9′ 10.125″	280	WD	CL	WD-AL	WD-AL	2W-TS	YES		ST TU	35	85	98	600	13500
36′ 4″	25′ 5″	7′ 7″	195	WD	CL	ST TU	CL	2W-TW	YES	R. DISC	AL	36	85	108	650	14370
36′ 8.5″	26′ 6.5″	7′ 4″	198	WD	CL	ST TU	CL	2W-TW	YES	R. DISC	AL					
34′ 11″	24′ 2.5″	7′ 7″	145	WD	CL	ST TU	CL	2W-TS	YES		ST-TU					
41′ 0″	25′ 1.125″	7′ 9.5″	243	WD-AL	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	46	101	120	640	19000
41′ 0″	25′ 1.125″	7′ 9.5″	243	WD-AL	CL	ST TU	CL	2W-TS	YES	OIL	ST TU					
41′ 0″	25′ 1.125″	7′ 9.5″	243	WD-AL	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	45	101	120	640	18000
36′ 0″	28′ 0″	8′ 0″	240	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	45	110	135	800	18300
40′ 0″	32′ 0″	10′ 10″	379	WD-AL	CL	WD	AL					43	84	104	500	13000
32′ 3″	29′ 4″	10′ 9″	448	WD	CL	WD	PLWD					40	80	102	600	15000
36′ 0″	26′ 3.5″	7′ 11.75″	244	WD	CL	WD	AL					42	90	112	1000	15000
				AL	CL	AL	AL	2W	YES	OIL	ST TU					
41′ 8″	29′ 0″	8′ 6″	236	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	47	113	135	1000	20000
41′ 8″	29′ 0″	8′ 9″	236	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU					
41′ 8″	29′ 0″	8′ 9″	236	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	45	103	125	600	15000
41′ 0″	28′ 2″	7′ 8″	268	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	50	125	160	1300	21000
41′ 0″	28′ 2″	7′ 8″	268	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	48	115	147	1000	18200
41′ 0″	28′ 2″	7′ 8″	268	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU					
38′ 7″	21′ 7″	8′ 3″	202	WD-ST-TU	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU	42	111	130	640	13000
				WD	CL	ST TU	CL	2W-TS	YES	R. CORD	ST TU					
40′ 0″	25′ 7″	7′ 3″	228	WD	CL	ST TU	CL	2W-TW	NO	OIL	ST TU	45	120	142	1000	
39′ 0″	26′ 8″	7′ 8″	222	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	48	112	133	1200	22000
39′ 3″	28′ 0″	9′ 9″	220	WD-ST	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	55	110	130	900	22000
44′ 0″	28′ 9″	8′ 0″	275	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	50	105	130	850	16750
45′ 6″	30′ 6″	9′ 2″	290	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	56	109	130	700	17000
41′ 0″	24′ 1″		236	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU		115	142		
43′ 6″	27′ 4″	8′ 8″	240	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU					
41′ 0″	25′ 1.125″	7′ 9.5″	243	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU					
33′ 2″	24′ 6″	9′ 0″	309	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	40	103	120	875	
				AL	CL	AL	AL	2W-TS	YES	OIL	ST TU					
36′ 0″	32′ 1″	13′ 4″	389	AL-WD	CL	AL	AL	2W-TS	YES	OIL	ST TU	50	90	116	950	17000
				AL-WD	CL	AL	AL	2W-TS	YES		ST TU					
45′ 0″	26′ 6″	10′ 2″	350	WD	CL	AL	CL	2W-TS	NO	OIL	ST TU	37	100	114	1200	24000
34′ 4″	27′ 10″	6′ 0″	207	WD	CL	ST TU	CL	2W-TS	NO	OIL	ST TU	35	95	118		
40′ 0″	31′ 0″	12′ 2.5″	376	WD-AL	CL	ST AL	AL	2W-TS	YES		ST TU	48	105	120	950	19000
44′ 2.25″	33′ 3.187″	11′ 8″	545	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	57	115	138	800	17000
45′ 0″	32′ 6″	10′ 2″	350	WD	CL	AL	CL	2W-TS	YES	OIL	ST TU	37	100	110	1200	24000
49′ 0″	32′ 6″	12′ 6″	490	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	55	110	135	950	15000
42′ 6″	27′ 6″	8′ 4.5″	288	WD	PLWD	WD	PLWD	2W-TS	YES	OIL	ST TU	60	147	172	1500	21000
41′ 0″	27′ 6″	8′ 4.5″	275	WD	PLWD	WD	PLWD	2W-TS	YES	OIL	ST TU	55	135	180	1500	23000
48′ 0″	32′ 4″	9′ 3″	305	WD-AL	CL	ST TU-AL TU	CL	2W-TW	YES	OIL	ST TU	55	88	110	450	12500
48′ 0″	32′ 4″	9′ 3″	305	WD-AL	CL	ST TU-AL TU	CL	2W-TW	YES	OIL	ST TU	56	101	119	650	12500
50′ 0″	34′ 6″	9′ 3″	312	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	50	98	125		
48′ 10″	33′ 6″	9′ 6″	315	WD	CL	ST TU	CL	2W-TW	YES	R. CORD	ST TU	40	100	130	1000	18000
48′ 10″	33′ 6″	9′ 6″	315	WD	CL	ST TU	CL	2W-TW	YES	R. CORD	ST TU	46	105	125	750	20000
42′ 4″	29′ 11″	9′ 0″	275	WD-ST	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	60	120	150	1350	27000
42′ 4″	28′ 4″	9′ 0″	275	WD-ST	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	55	112	138	1000	25000
43′ 0″	30′ 4″	8′ 2″	296	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	45	115	145	900	20000
47′ 0″	32′ 8″	9′ 0″	292	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	50	115	135	1000	18500
47′ 0″		9′ 0″	292	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU					
41′ 8″	29′ 8″	9′ 11″	370	AL TU-ST TU	CL	ST TU	AL	2W-TS	YES		ST TU	45	115	136	1050	20000
40′ 0″	29′ 8.25″	8′ 7″	315	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	45	115	145	900	18000
48′ 6.5″	31′ 2″	9′ 3″	280	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	60	110	130	800	18000
54′ 5″			340	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU					
46′ 4″	27′ 9″	8′ 4″	320	WD	CL	ST TU	CL	2W-TS	YES	OIL	ST TU	48	122	145	1100	19900
39′ 8.25″	32′ 7.187″	12′ 1.5″	470	WD	CL	WD	PLWD					59	110	133	1000	13500
41′ 0″	27′ 6″	8′ 4.5″	275	WD	PLWD	WD	WD	2W-TS	YES	OIL	ST TU	55	135	165	1200	20000
41′ 0″	27′ 6″	8′ 4.5″	275	WD	PLWD	WD	WD	2W-TS	YES	OIL	ST TU					
59′ 0″	43′ 4″	12′ 11″	550	WD	PLWD	ST TU	CL	2W-TW	YES	R. CORD	ST TU	55	115	140	1200	20000
47′ 9″	33′ 0″	8′ 9″	300	WD	PLWD	ST TU	CL	2W-TS	YES	R. CORD	ST TU	46	105	126	830	15000
				AL-ST	CL	AL TU	CL	2W-TW	YES		ST TU	55	119	130	900	17000
50′ 0″	32′ 10.25″	9′ 4″	332	WD	CL	ST TU	CL	2W-TW	YES		ST TU					
50′ 7″	36′ 7″	8′ 11″	370	WD	PLWD	ST TU	CL	2W-TS	YES	R. CORD	ST TU	48	118	138	1000	20000
52′ 8.25″	34′ 3.75″	9′ 8″	334	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	50	125	148	1200	20000
57′ 0″	36′ 0″	12′ 0″	483	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU					
57′ 0″	36′ 0″	12′ 0″	483	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	50	100	130		16000
46′ 4″	27′ 9″	8′ 4″	320	WD	CL	ST TU	CL	2W	YES	R. CORD	ST TU					
59′ 0″	45′ 0″	13′ 0″	500	WD	PLWD	AL	AL	2W-TS	YES		ST TU	50	100	125	950	
46′ 8″	34′ 8″	13′ 2″	517	WD-AL	CL	WD-AL	AL	2W-TS	YES	OIL	ST TU	55	105	130	800	17000
50′ 0″	32′ 6″	9′ 6″	365	AL	AL	ST TU-AL	AL	2W-TW	YES	OIL	ST TU	60	110	135	550	15000
48′ 0″	36′ 0″	10′ 0″	462	WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU	45	110	140	1100	20000
54′ 5″	34′ 8″	9′ 6″	387	AL	AL	AL	AL	2W-TW	YES	OIL	ST TU	55	120	145	1000	18000
45′ 0″	31′ 5″	9′ 2″	313.5	WD	PLWD	AL	AL	2W-TW	YES	OIL	ST TU	59	145	175	1500	21000
58′ 5″	36′ 10″	9′ 9″	490	WD	CL	ST-PLWD	CL	2W-TW	YES	OIL	ST TU	60	133	157	1180	23000
58′ 5″	36′ 10″	9′ 9″	490	WD	CL	ST-PLWD	CL	2W-TW	YES	OIL	ST TU					
				WD	CL	ST TU	CL	2W-TW	YES	OIL	ST TU					
				WD	CL	ST TU	CL	2W-TW	YES	R. CORD	ST TU					
71′ 8″	40′ 3″	13′ 10″	720	AL	CL	WD	AL	2W-TS	YES	OIL	ST TU	55	110	125	880	18800
79′ 3″	50′ 0″	12′ 8″	850	WD	PLWD	ST TU	CL	2W-TW	YES	R. CORD	ST TU	55	118	140	1400	20000
74′ 0″	49′ 10″	12′ 8″	785	AL	AL	AL	AL	2W-TW	YES	R. CORD	ST TU	58	110	130	950	16000
77′ 10″	49′ 10″	13′ 8″	835	AL	AL	AL	AL	2W-TW	YES	R. CORD	ST TU					
77′ 10″	49′ 10″	13′ 8″	835	AL	AL	AL	AL	2W-TW	YES	R. CORD	ST TU	63	112	134	850	15600
78′ 9″	54′ 1.5″	16′ 5″	960	WD	PLWD	WD	WD					62	106	132	600	13000
77′ 10″	49′ 10″	13′ 8″	835	AL	AL	AL	AL	2W-TW	YES	R. CORD	ST TU	64	113	133	950	18000
80′ 0″	54′ 7″	13′ 0″	1250	AL	CL	ST TU	CL	2W-TW	YES		ST TU	55	115	138	900	16500
88′ 0″	46′ 0″	11′ 0″	1060	WD-AL	AL	AL	AL	2W-TS	YES		ST TU	52	128	150		16500
91′ 8″	57′ 1″	16′ 6″	1512	ST AL	CL	ST TU-AL	CL	2W-TS	YES		ST TU	49	116	139	870	19200
88′ 0″	63′ 0″	13′ 0″	930	WD	CL	ST TU	CL	2W-TW	YES		ST TU	57	120	144	1080	17400
100′ 0″	61′ 9″	17′ 4.5″	1110	AL	CL	AL	AL					60	90	125	675	12300
99′ 0″	69′ 10″	16′ 6″	1350	WD	PLWD	ST TU	CL	2W-TW	YES		ST TU	60	120	140	1200	20000

SUPERCHARGERS FOR ENGINES

By Dr. S. A. Moss, *Engineer*
Thompson Research Laboratory, General Electric Company

GEARED centrifugal superchargers now in extensive use on commercial airplane engines are used for some or all of four independent purposes: (1) improvement in distribution of engine charge, with carburetor and inlet pipe simplification; (2) maintenance of full power at moderate altitude; (3) increase of power at sea-level for short periods and emergencies; (4) increase at normal full load power at sea-level.

The superchargers in commercial use are centrifugal compressors geared from the engine crankshaft and with such rotative speed and design detail as to give an appreciable pressure rise. A system of coöperation between the engine builder and the supercharger manufacturer has been devised so that the supercharger is not an external accessory, but an integral part of the engine. The air passages, impeller castings and diffuser are built as integral parts of the engine crankcase according to designs furnished by the supercharger manufacturer, so that the high speed impeller itself becomes the only part which the supercharger manufacturer supplies.

The Centrifugal Compressor

The centrifugal compressor is an apparatus for compressing air to appreciable pressures, similar in a general way to the well-known fan blower and centrifugal pump. The various air and impeller speeds and the pressure rise produced in proportion to the density, however, are much greater than in such blowers and pumps.

In the centrifugal compressor (and supercharger) air enters the high speed impeller near the center, through an eye, or annulus, so proportioned as to give a proper compromise between too high a velocity of the fluid as it enters the impeller and too high a velocity of the blade tips which receive the fluid. The inlet tips of the impeller blades are bent forward so as to receive the fluid without shock. This is because the fluid at the inlet edges of the blades is proceeding at a certain angle relative to the blades. This relative direction is, of course, different from the absolute direction of the inlet fluid in space. The inlet edges of the blades must be exactly faced in the relative direction of the fluid. The impeller passage then curves so as to bend gently the stream of the fluid and pass it to the exit edges of the impeller blades, which are always in a radial direction. During the flow along the impeller from entrance to exit, the fluid has a certain relative velocity with respect to the impeller. The passage areas are so maintained as to keep this relative velocity comparatively small to minimize friction loss. At the impeller exit there has been produced an appreciable pressure as a result of the so-called "centrifugal effect." The fluid furthermore has a high absolute velocity which is practically the velocity of the tips of the impeller blades. This velocity represents a certain amount of kinetic energy which has been imparted to the fluid, but which is not in useful form. This high-velocity fluid is discharged into a carefully designed passage beyond the impeller, called a "diffuser." This diffuser is so shaped as gradually to slow down the velocity of the fluid with a minimum of friction and eddy loss. Such an efficient decrease of velocity results in an increase of pressure, so that at the diffuser exit there is a pressure appreciably greater than that at impeller exit, due to "conversion of velocity into pressure."

Centrifugal compressors operate with peripheral speed at the tip of the impeller of from 500 to 1,500 feet per second. In the case of present airplane engine superchargers, the diameters are such as to require rotative speeds of from 15,000 to 30,000 revolutions per minute. It is, of course, very easy to make an improper design, which may have any low efficiency whatever.

Design of the Built-in Supercharger

When the supercharger is built in directly as a part of the engine, of course it is required that the engine be especially designed so that the supercharger properly fits. In some cases, engines initially operated without superchargers have been redesigned so as to add a supercharger.

In these supercharged engines, there is a a group of gears which serves for the magnetos, starter, oil pump, generator, etc., and an additional gear or two for the supercharger is taken off this train. In most cases, two pairs of gears are used to get the complete supercharger gear ratio which varies between 7-to-1 and 14-to-1.

The supercharger impeller is designed so as to have exceedingly low inertia. Nevertheless, the acceleration and deceleration of the impellers as the engine is started and stopped, involve some gear stresses. In most cases, the gears easily stand this stress. In some cases for the higher gear ratios, however, it is thought desirable to install a few discs and a spring constituting an automatic slipping clutch. This is so set up as to operate without slipping during full speed operation, but so as to slip a little bit during starting and stopping.

The casing in which the impeller rotates, and the diffuser beyond the impeller are formed by the engine castings. The diffuser leads into an annular passage from which are led pipes to the inlet valves of the various cylinders.

The carburetor arrangement in supercharged engines is simple, there being but a single path from atmosphere to the inlet of the supercharger impeller. In most cases there is a single barrel carburetor. In some cases, however, the diameter of a single barrel to handle the air volume would be unduly great and a double barrel carburetor is then used. The two barrels of the carburetor are, however, directly connected to each other with a common inlet and discharge. There is none of the complication of separate paths through independent carburetor barrels to separate banks of engine cylinders, as often occurs with unsupercharged engines. It is usually desirable to have a hot spot or heater connected with the exhaust between the carburetor and the supercharger inlet to avoid difficulty with the gasoline vaporization in cold weather. The ordinary type of carburetor throttle is used



Curtiss pursuit plane of the U. S. Army Air Corps equipped with exhaust-driven engine supercharger

in the passage between the carburetor and the supercharger inlet, and this furnishes the entire supercharger regulating arrangement.

Improvement in Distribution

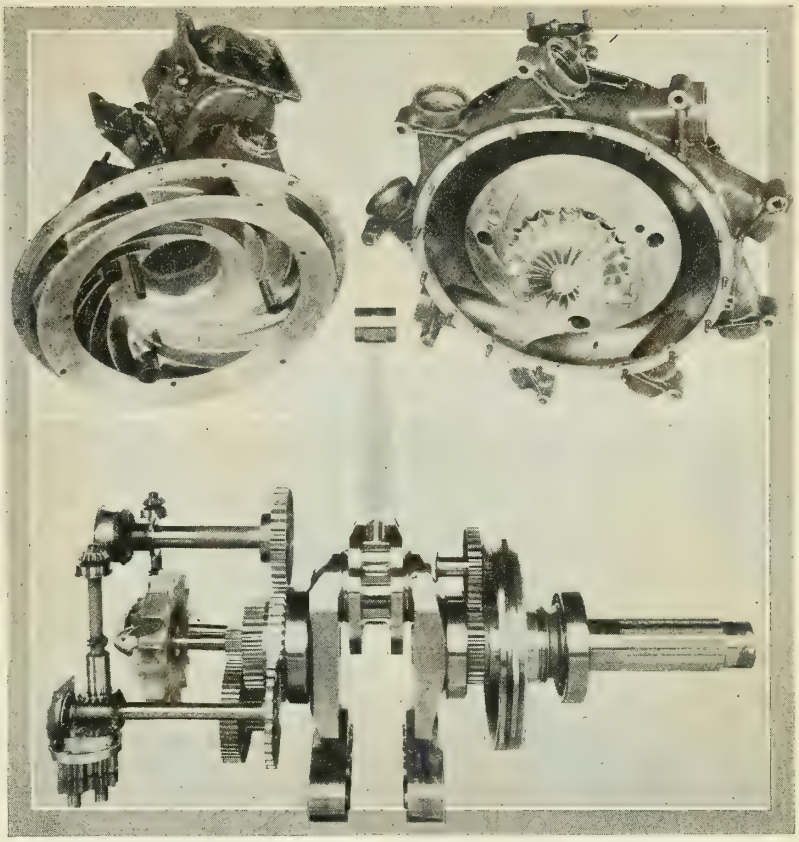
One of the most important advantages of the supercharger as used in airplane engines is the improvement in distribution. In some early cases a centrifugal supercharger was used primarily for its effect in improvement of distribution and such an arrangement was then called "rotary induction." However, an efficient supercharger operating at a speed high enough to give the proper improvement in distribution also gives a positive pressure in the intake manifold of about 3½ inches of mercury. This means an absolute pressure of about 33 inches of mercury. On the other hand, if no supercharger were used there would be a negative pressure in the manifold of about 1½ inches of mercury or an absolute pressure of 28 inches of mercury. This gives a percentage increase in charge of 5/28 or about eighteen per cent, corresponding to a power increase at full throttle of nearly the same amount. This is an appreciable amount of supercharging, so that there is no reason for calling the outfit a rotary inductor rather than a supercharger.

It is believed that the diffuser exercises an important function in the vaporization so successfully accomplished by an efficient supercharger. In order that a diffuser may exercise the function for which it is primarily provided, the conversion of velocity into pressure, the air is necessarily guided through it in curved paths with gradual decrease in velocity. The gasoline drops which leave each of the impeller blades on their forward edges are discharged into the air passing along the diffuser, with constant velocity and in straight lines. The result is that each gasoline drop continually meets new air so that complete vaporization is secured by the time the end of the diffuser is reached. The compression of air by a centrifugal supercharger also creates a slight temperature rise, and this gives a slight increase in the vaporization. With ordinary amounts of supercharging, however, the temperature rise is not such as to give appreciable decrease in the weight of cylinder charge.

The vaporization system mentioned is sufficient and without addition of hot spots or heat of any kind for ordinary weather. As already mentioned, however, there must be added some sort of passage heated by the exhaust avoiding clogging of the carburetor by ice formed by the gasoline vaporization in cold weather.

Theory of Supercharging at Sea-Level

In a general way the power of an engine with a given displacement varies directly with the absolute pressure in the intake pipe. If the supercharger pressure or efficiency is such as to give appreciable temperature rise, however, there is decrease of charge due to this effect and then the power varies approximately as the density of the entering charge. It is of course assumed that, as the amount of supercharging is increased, the compression pressure is maintained.



Supercharger unit of P. & W. Wasp engine, and supercharger gear train

This requires an increase of the clearance volume.

In some cases, by using specially prepared fuel, supercharger pressures have been increased without changing the clearance volume, which of course gives increased compression pressure, resulting in an additional increase in power over that due to the direct increase of charge due to supercharging.

With proper valve timing, a supercharged engine may have the clearance space scavenged and filled with fresh charge. In this event, the power increase is, of course, greater than that corresponding to merely filling the displacement with increased charge.

A supercharged engine with a given compression pressure does not finally expand the charge to as low an absolute pressure as an unsupercharged engine with the same compression pressure. A great deal of test data indicates as a net result that the fuel consumption with a supercharged engine is equal to or in some cases slightly less than that without supercharging.

Power Limit for Supercharging at Sea-Level

In all cases it has been easy to supply a supercharger to increase the power of an engine at sea-level to the maximum amount advisable, from the point of view of the engine itself. Sometimes the limit is detonation; and this limit can be increased by the use of anti-knock mixtures or by increase of clearance volume. Sometimes the limit is the maximum power which the engine will deliver with safety so far as durability is concerned. Engine builders are making gains in this connection and the safe values of engine power are going up.

Some engines, however, will operate for long periods without overhauling if the maximum power is limited and will require more frequent overhauling if this limit is exceeded. Such engines may use superchargers with capacity for emergency or altitude operation, with limitation of the amount of supercharging for normal operation. Sometimes the limit of supercharging is due to temperature rise of the supercharged air resulting from compression to high supercharger pressures. In this case the limit can be increased by use of an air cooler. Sometimes the limit of supercharging at sea-level is the temperature attained by the cylinder with the increased power and the available amount of cooling. In the case of the similar sizes of radial air-cooled engines, this limit has never been reached. As the size of the cylinder decreases, the ratio of surface to volume increases so that the cylinder can radiate a greater amount of heat in proportion. This means that the mean effective pressures on the smaller engines can be increased by using large amount of supercharging and still maintain safe temperatures. A small radial air-cooled engine with a supercharger thus added to give the maximum desirable power and still maintain safe temperatures, would have a much lower cost and weight per horsepower than an unsupercharged

(*Continued on next page*)

(Continued from preceding page)

engine. There is, therefore, a great deal of possibility of progress in the supercharging of small engines.

Supercharging at Altitude

It is comparatively easy to supercharge an engine so that it will maintain full sea-level power at altitudes up to about 12,000 feet. Supercharging for higher altitudes usually requires the use of an air cooler. If a supercharger is added to an engine primarily for the purpose of increasing power at altitude, then the amount of power developed at sea-level is an independent consideration. Very often, because of some one of the limitations mentioned above, the engine will not safely deliver the amount of power corresponding to full supercharging at sea-level. In such case, the carburetor throttle valve must be properly regulated and not opened up to the full amount until appreciable altitude is obtained. Sometimes "throttle stop" is provided which limits the opening when near sea-level. By making a certain extra motion, however, the throttle valve can be moved past the throttle stop and this is permissible after some altitude is obtained.

Without a supercharger, the power of an airplane engine falls off rapidly even at moderate altitudes. The restoration of sea-level power up to altitudes of about 12,000 feet, which as stated, is easily possible with a geared centrifugal supercharger, gives a remarkable improvement in the performance of the airplane, often increasing the speed at altitude fifty per cent over the value without a supercharger.

Elimination of Carburetor Drop

In a number of cases, a given supercharged engine has inadvertently come through with a restricted inlet or too small a carburetor, so that full power was not delivered for this cause. It has been comparatively easy to change the gear ratio of the supercharger so as to speed it up a little and thus get an additional pressure rise to overcome any inadvertent friction and obtain full power. This practice is not, of course, to be commended and it is only to be used as a makeshift. Every effort should be made to have all passages so large that the friction drop will be negligible when a supercharger is used. It is, of course, possible to go much farther in this connection with a supercharger than without. This is for the reason that, when no supercharger is used, certain velocities must be maintained in the inlet passages and through the carburetor choke in order to give proper vaporization and to avoid dropping out gasoline. With a supercharger, however, no attention need be paid to such matters and the velocities may be comparatively low and the choke comparatively large regardless of gasoline vaporization. As already mentioned, the vaporization secured by the supercharger alone is entirely adequate under these circumstances. For this reason an engine with a supercharger can have a larger choke and larger inlet passages than otherwise so that the total pressure increase at the inlet valves is greater than the pressure rise of the supercharger by the amount of decrease in inlet friction.

Speed Variation

Normally an airplane engine is not operated through a very wide range of speeds. It is, however, frequently desirable to operate for a period at speeds above normal. Any unsupercharged aviation engine usually gives its maximum power at a given speed with less power before and after. This is because of the fact that as the engine speed increases, the friction drop through carburetor, inlet pipes and inlet valves increases so that there is a successively decreasing amount of charge. This, of course, decreases the torque and the power. If it were not for this additional friction loss at increased speed, the torque would be constant and the power would increase directly with the speed. Actually the torque successively decreases so that the power at first increase at a slower rate than that due to speed increase, presently reaches the maximum and thereafter decreases instead of increases due to speed. This possibility is completely eliminated with a geared supercharger.

Such a supercharger might be designed to overcome exactly the friction drop in carburetor, inlet passages and inlet valves, so as to give exactly atmospheric pressure in the cylinders at the beginning of compression. To a first approximation, the friction drop through carburetor, inlet pipes, and inlet valves would vary with the square of the rotative speed. The pressure rise produced by a geared supercharger also varies approximately with the square of the rotative speed. Hence, at every speed, the supercharger pressure rise will exactly balance the friction drop and there will be atmospheric pressure in the cylinders at all speeds. Such a supercharger will give exactly constant torque, and power varying directly with the speed, up to the limit at which it is safe to operate the engine. There would be no tendency to detonation in such an engine, inasmuch as the compression pressure would be constant at all speeds.

If a somewhat greater amount of supercharging is provided than that above assumed, then as the engine speed is increased the supercharger pressure will more than counterbalance the inlet friction, so that the cylinder pressure at the beginning of compression will successively increase with the speed. A limited amount of such excess supercharging will not give detonation, inasmuch as the compression pressure at which detonation occurs increases with the speed. Such an amount of supercharging will give increase of torque with speed. A limited amount of this will give no difficulty. If further amounts of supercharging are attempted, however, compression will increase to such an extent at the higher speeds as to cause detonation. If such an amount of supercharging is necessary, anti-knock compound must be added to the fuel.

Extracts from a paper presented before the S. A. E. meeting at Detroit, April, 1930.

AIRCRAFT CARBURETOR SERVICE TOOL KIT

THE Stromberg Motor Devices Company carburetor manufacturer, now has available a complete set of tools for servicing Stromberg aircraft carburetors. This tool kit is adapted especially to the needs of both organizations giving service on Stromberg aircraft carburetors and airways operators doing their own service work on engines and accessories.

Special equipment, including line reamers, is provided for the removal and installation of throttle bushings. Special sockets and screw drivers, to be used with a "snap on" handle, take care of such parts as needle valve seats, discharge nozzles, float fulcrum screws, etc.

Special screw drivers facilitate the removal of economizer discharge nozzles, mixture control nozzles, and other parts located at the end of drilled passages. All the taps and dies necessary for reconditioning threads are included in the set.

The complete equipment comes in a special metal box, suitable for use in the shop or field.

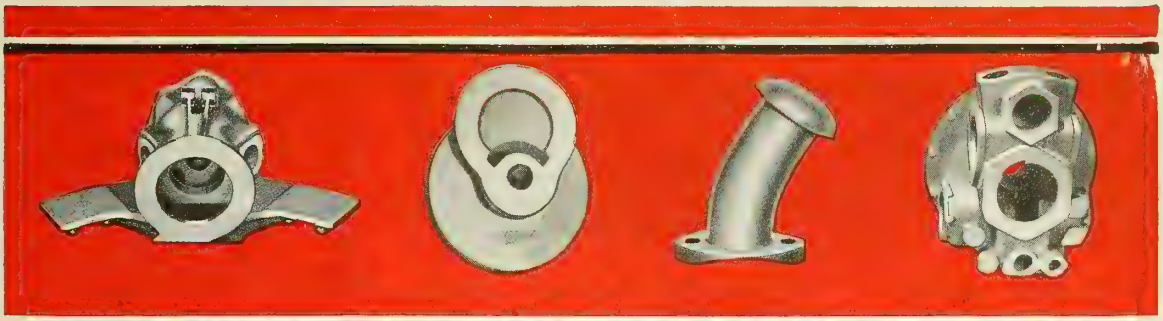


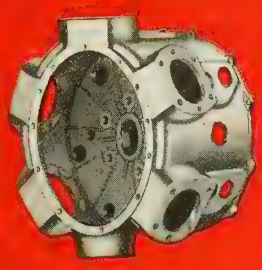
Carburetor service tool kit

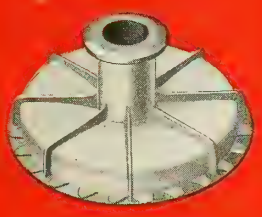
BACKFIRE TRAP

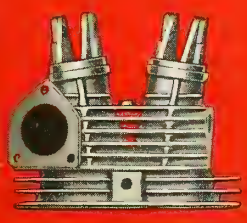
A BACKFIRE trap for use as a safety precaution and as an air cleaner has been developed for use on aircraft engines by the N. L. Oberdorfer Brass Company of Syracuse, N. Y. This device is designed for attachment to the air in-take of the carburetor and can be used with practically any type of carburetor. The trap is constructed of non-corrosive metals and, according to the Oberdorfer company, will withstand the force of the most powerful backfire possible in an aircraft engine.

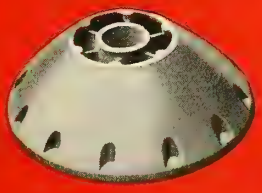
The device consists of a series of concentric cylinders. The flame of backfire explosion is forced into the trap where it is broken up into numerous tiny jets, which are forced through three louvered sections which further break up the force of the flame and reverse its direction, the gasses being cooled in the process.











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Say you saw it in AERO DIGEST





THE SIKORSKY S-39 LIGHT AMPHIBION

THE most recent model developed by the Sikorsky Aviation Corporation is the S-39, an amphibion designed for private flying. Powered with a Wasp Junior engine, the ship is said to have a good performance under flight conditions.

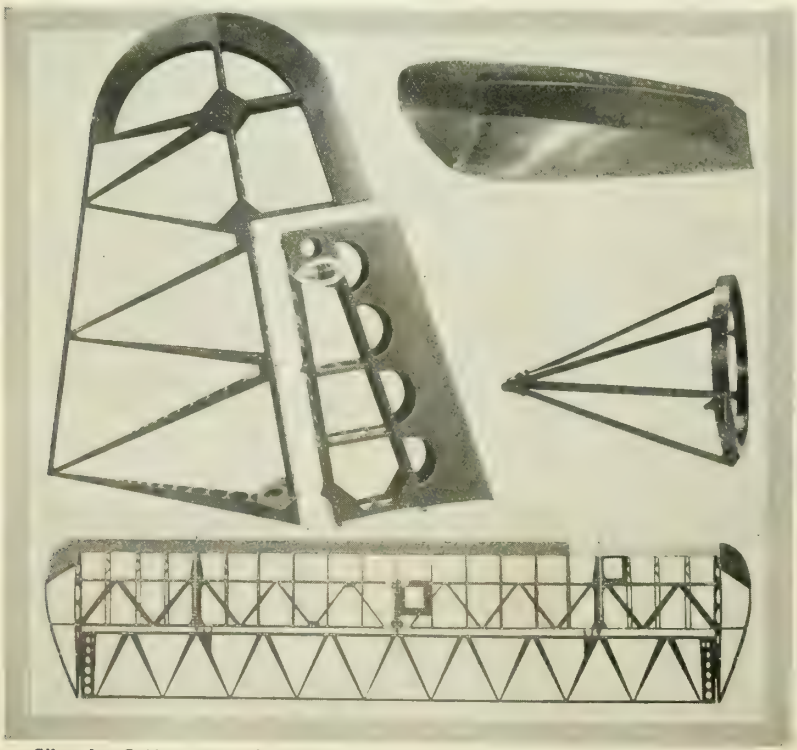
The all-metal hull consists of metal framework covered with Alclad sheets. It has well streamlined entrance lines and a sharp curved V bottom. The hull is divided into four water-tight compartments. Entrance to cabin is obtained through a hatch in the top, extending the entire length of the cabin.

The wing pontoons, constructed in the same manner, have two water-tight compartments each, and are interchangeable. The single wing of the plane is of metal, fabric covered. The fabric covering permits confining stresses to definite structural members and tie rods, resulting in full strength without additional weight, and ease of maintenance and repairs. The outer panels can be detached for storage, making a total width of the ship eighteen feet two inches.

The tail unit, constructed in the same manner, is placed in a high position to be free from danger in taxying on rough water or on land.

All outside struts are streamlined duralumin tubing. All principal strut fittings are on universal joints, to reduce the possibility of metal crystalization and to give a sturdy yet flexible structure.

The retractable landing wheels have a wide tread. The hydraulic retracting system operates the wheels either separately or simultaneously, and in exceptionally difficult water operation, either wheel can be used as a water rudder in maneuvering the ship.



Sikorsky S-39 construction details: fin and rudder, metal wing float, engine mount, and (bottom) elevator and stabilizer assembly

This amphibion can be easily converted into a flying boat by removing landing gear and tailwheel, thereby increasing the payload by 200 pounds. This operation requires approximately fifteen minutes.

The S-39 is powered by one Pratt and Whitney Wasp Junior engine of 300 horsepower. The power plant, equipped with a self-starter, is mounted on top of the wing. The tractor type propeller is Hamilton Standard, and the mounting of the engine in relation to the cabin is such that the pilot, passengers and all controls are outside of and behind the propeller zone. Gasoline tanks and lines are all located in the upper wing.

The cabin is roomy with a wide hatch extending its entire length. It is easy to change seats and go to the forward seat beside the pilot, where the dual control is located.

Specifications

Span	52 feet
Length overall	32 feet 2 inches
Height on wheels	11 feet 8 inches
Tread of wheels	10 feet
Chord	85 inches
Dihedral	1½ degrees
Wing area (including ailerons)	350 square feet
Aileron area	30 square feet
Stabilizer area	30 square feet
Elevator area	19.5 square feet
Fin area	9.75 square feet
Rudder area	11.75 square feet
Weight empty	2,500 pounds
Gasoline	420 pounds
Oil	45 pounds
One pilot	170 pounds
Three passengers	510 pounds
Luggage	55 pounds
Gross weight	3,700 pounds
Wing loading	10.57 pounds per square foot
Power loading	12.33 pounds per horsepower
Fuel capacity	70 gallons
Oil capacity	6 gallons

Performance

(With Useful Load of 1,200 Pounds)

High speed	122 miles per hour
Cruising speed at 1,700 r.p.m.	100 miles per hour
Stalling speed	48 miles per hour
Initial climb	900 feet per minute
Ceiling	18,000 feet
Take-off from land	5-10 seconds
Take-off from water	10-15 seconds

ABSOLUTE DEPENDABILITY

Champion's Aero A

CANNOT Fail



THE superior performance of Champion Spark Plugs is traditional. The limit of their abilities has never been reached. By always anticipating engineering demands, Champion has been *the* pioneer in improving spark plug design and practice, and better engine performance.

Developed after three years of the most exhaustive research and exacting tests, the new Champion Aero A is revolutionizing spark plug practice and performance for all aircraft engines.

Heretofore, one of two types of spark plugs was used in aircraft engines. In their tireless efforts to build better spark plugs, Champion engineers worked to correct certain inherent weaknesses in each. One type showed a pronounced tendency to pre-ignite and foul; the other to break in service, bringing danger from fire and unbalance.

The Champion Aero A brings a new meaning to spark plug efficiency for aircraft engines. Built to withstand the widely varied conditions to which an aviation spark plug is subject, pre-ignition and breakage are practically impossible. In the unique design of its exclusive sillimanite insulator, the primary is protected by the secondary or "dome" insulator, so that it *positively cannot be broken in such a way as to interfere with engine operation.*

These and other exclusive features have won for it instant recognition and a rapidly growing demand from transport lines, mail lines, racing flyers and private owners, alike.

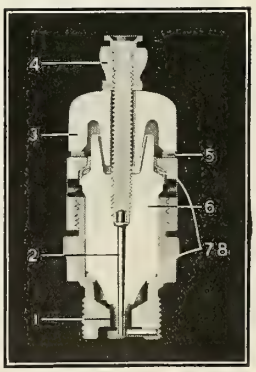
Install a set of Champion Aero A spark plugs in your plane. They will bring to your engine a new factor of safety, and the vastly improved performance and dependability for which Champions are preferred the world over.

CHAMPION

SPARK PLUGS

for Aviation

TOLEDO, OHIO WINDSOR, ONT.



Champion Aero A Exclusive Features

1. Restricted bore. 2. Special analysis electrode. 3. Secondary sillimanite dome insulator. 4. Welded steel terminal. 5. Copper seal. 6. Primary sillimanite insulator. 7-8. Molded copper gasket seals.

Concentration on this one type spark plug for practically all aircraft engines enables Champion, through large production, to offer this vastly superior spark plug at the extremely low price of $1.25.

THE NEW ACE OF SPARK PLUGS

AC MIKO

With heat range advantages

The New AC Miko line offers the special advantage of Heat Range —with seven gradations of insulator lengths to meet the heat characteristics of different engines and different operating conditions.

For example, a spark plug that gives good service under normal operation may be unsatisfactory when the ship is used constantly for extremely severe service. The remedy for a "hot running" engine and pre-ignition is to use spark plugs having shorter insulation exposed to the combustion heat. This will reduce operating temperature of the spark plugs.

On the other hand continuous running at low engine speeds may result in a "cold running" engine and fouling of spark plugs. In this case, use spark plugs having longer insulation which run hotter and thus keep the carbon burned away.

With the advantage of Heat Range, AC Miko Plugs offer also these superior features:

Laboratory tested mica of highest insulating quality.

Brass bushing sealed by electrical process. Absolutely gas tight.

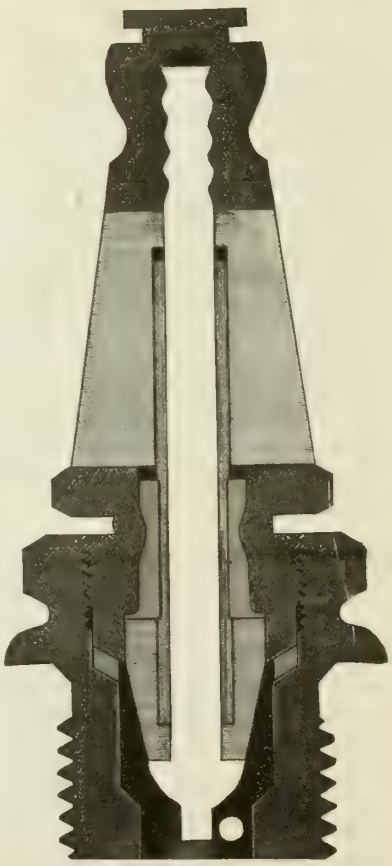
The "Isoyoke" electrodes, a new development, insure uniform sparking voltage, longer electrode life, and require 50% less voltage than other wire.

Electrically welded, patented, side-electrode provides 35 times better electrical and 3 times better heat conductivity than a side-electrode inserted by the old "staking" method.

Terminal is fused to center electrode by electrical process, eliminating danger of terminal becoming loose.

Design of side-electrode makes re-gapping easy.

Steel shell chrome plated to prevent rusting.



Cutaway view showing superior construction of AC Miko Spark Plugs

The popular line of AC porcelain-insulated AC Spark Plugs is likewise available in a Heat Range, with gradations of insulator lengths to meet "normal", "hot running" or "cold running" conditions.

For greater certainty of performance, give yourself the benefits of AC quality, with a spark plug chosen from the Heat Range to meet your particular requirements.

AC-SPHINX
Birmingham
ENGLAND

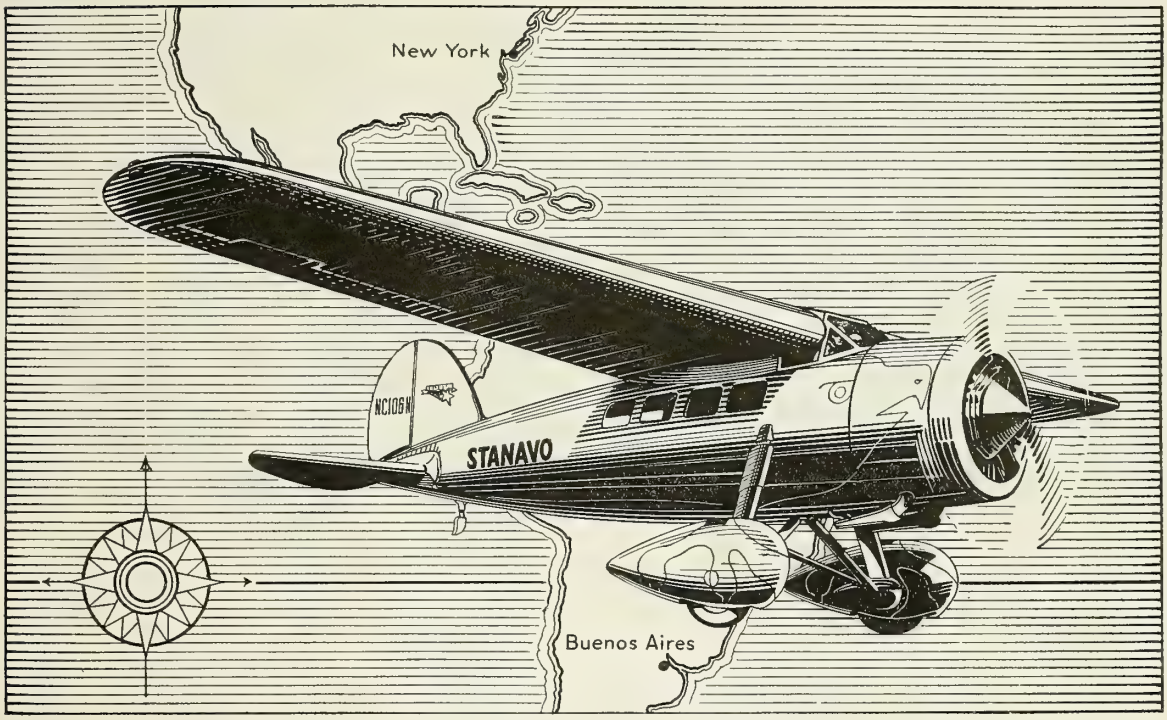
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Recently, they contributed to another world record flight—when Lieutenants White and M. S. Mullen flew Lockheed No. 1, of the Standard Oil of New Jersey fleet, from New York to Buenos Aires in 51 hours, 36 minutes, flying time. Another demonstration of U. S. dependability was written into the record books of aviation. The most substantial progress in the aeronautical world today is being made by those who are employing products and principles proven by a generation of American flying. Among these are safe, sure, practical U. S. Tires—first in aviation, and still the pioneer.

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U.S. ROYAL AIRPLANE TIRES

Say you saw it in AERO DIGEST

LIGHT AIRPLANES OF ITALY

By Paul E. Lamarche

ITALY'S present-day air development has largely taken place within the past five years. Prior to 1926 there was no commercial aviation in Italy, nor was there such a thing as an Italian *aeromobile da turismo*, or light touring plane, in that country previous to 1928. In fact, it might be said that the only flying in Italy before 1926 was that of the military service, for in Italy, as in other nations in Europe, aviation development suffered from inertia after the hostilities that ended some twelve years ago. But in Italy, aviation for a time seems to have suffered from neglect even more than in other nations, for during the years immediately following the war, before that country underwent a change of government, aviation was virtually abandoned and was at its lowest ebb.

At present, however, Italy is able to boast of an air development of which her people have reason to be proud. The Italians have created a network of airlines that radiate in all directions. They have an efficient and well-equipped military service and within the past few years have established world's records for speed and distance. In fact, they have established themselves in the skies in such a manner that they are well able to compete with the best in other countries. Their light airplane industry, though very recently developed, has produced results within its two years of existence that have placed that phase of Italian aviation in active competition with the leading nations of Europe which have developed the light touring plane extensively.

All of which has been largely the result of efforts of an air-minded dictator and his well organized air ministry. With Mussolini piloting the Italian state, there have been very definite results, and those of us who have followed the economic and industrial conditions of the land of the Romans have noted this in many forms of industry. With aviation the Italian government has produced big results, having made a concerted effort to enlighten the Italians as to the advantages of flying. Primarily, it might be said, the commercial airlines were developed to compete with those of other nations which had in some cases been in operation for four and five years before the first Italian lines were started. Moreover, it was regarded as a necessary national development in keeping with modern progress and served as an excellent means of propaganda. In the same manner, the light plane has been developed in order to compete with the increasing activities of other European nations, particularly England, France and Germany, which nations have been most active in exploiting the light plane for private ownership and training purposes. The British methods in popularizing this form of flying seem particularly to have interested the Italian air ministry, and the development of that industry in Italy has been along similar lines.

In 1928 the Italian government invited aircraft firms to design and build light planes with its assistance and, at a meeting held at Montecelio (Rome), to submit them before the Technical Service for trials. Such planes as the Breda, Caproni, Cant-26, Macchi, A.S.1, and the Piaggio were accordingly constructed in response to the government's invitation and were presented at the Montecelio meeting. All of the competing planes were put through 100-hour test flights, and all of the planes entered were constructed according to government specifications. They were to cost not more than 50,000 lire which in our currency is approximately $2,632. All of the planes had folding wings, were equipped for night flying, carried adequate fire protection, had provision for the use of parachutes and could easily be converted into seaplanes by the substitution of floats for wheels. Other features were the dual control installations which could be disconnected by the pilot by means of a Bowden cable and an aileron control which permit the pilot to raise or lower the ailerons either simultaneously or differentially. These camber changing flaps or ailerons offer advantages in an increased lift and a reduced landing speed without interfering with the lateral control of the plane.

The designers of Italian light planes have been able to profit from the experience of foreign designers who have been building such planes for some time, with the result that the Italian touring planes are very modern and well-equipped and are capable of good performance. I have had an opportunity to inspect most of the Italian light plane types and was impressed by their finish and workmanship.

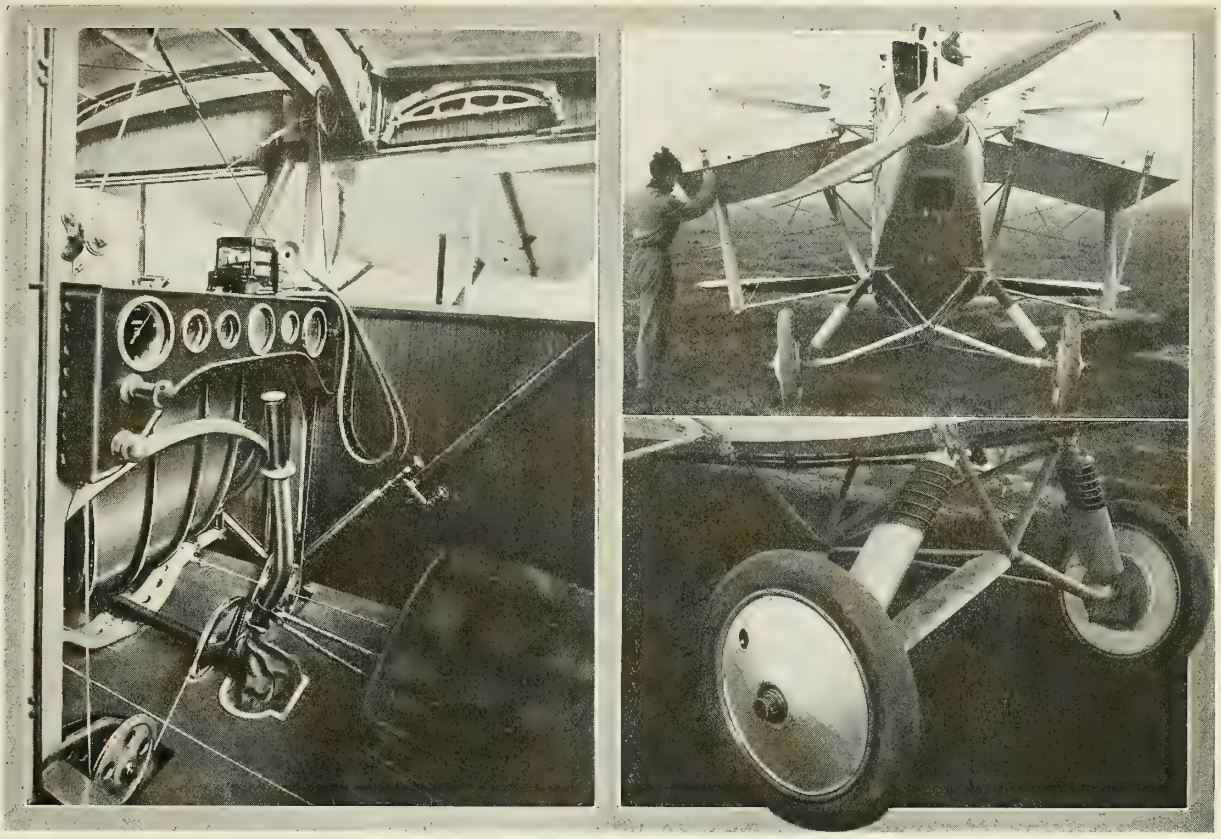
Though still young, the industry seems to hold much promise. The Italian government has been making great efforts towards promoting the industry and popularizing this form of flying. A number of air meets for light airplanes have been held, such as the "Mostra Nazionale dell' Aeromobile da Turismo" which took place last June, and the Circuit Lazio at the Aeroporto del Littorio of Rome, which was attended by 40,000 people. A number of Italian light planes likewise participated in the International Tour of Light Planes last year.

Milan and Rome have become centers for light plane activities, and the Aeroporto di Taliedo, the Milan field, has become a particularly important airport because of the proximity of a number of the aircraft plants. The "Aerocentio da Turismo dell' Aero Club di Milano," which was organized in August of 1927 under the auspices of the Royal Aero Club of Italy, is operated in much the same manner as are the light plane clubs in England. They received an initial grant amounting to approximately $10,528 for flying equipment and annually receive further support for maintenance.

At first the Italian light airplane builders had to obtain their motors from foreign markets, since there were no power plants produced in Italy suitable for these planes. Even now many of the Italian touring planes use such engines as the Cirrus, and the DH Gipsy in-line air-cooled engines, as well as the Walter and Anzani radial type motors. More recently, however, dependable engines for light planes have been developed by such Italian motor manufacturers as the Isotta Fraschini, Colombo, Fiat and Fuscaldo. Most of the Italian planes can be powered with any air-cooled radial or in-line engines of from 85 to 100 horsepower, though some are designed for the in-line motors only. In the following descriptions of Italian light planes, most of the performances given are for English in-



Breda 15 seaplane in tourist flight service at Viareggio, Italian Riviera



Interior of the Breda 15 monoplane. Folding wing and landing gear details

line 85-horsepower engines with which they were in most cases originally powered. Many of these models are of mixed construction, having wings of wood construction and fuselages of metal or partly of metal. Predominating among Italian light planes are monoplanes, which in all cases, are of the high-wing type with external bracings. All biplane types have their ailerons on the lower wings only and in most cases have the differential control. The A.S.1 and the Romeo Ro. 5, which were originally constructed as open-cockpit planes, have arrived at a simple solution of providing *cabina chiusa* by affixing glazed panels to the cabane struts over the fuselages.

BREDA 15

The Breda 15 is a two-seater high-wing cabin monoplane built by the Societa Ernesto Breda per Construzioni Meccaniche, of Milan. The Breda firm has been engaged in the construction of aircraft since 1917, at which time it was equipped for a daily output of four large bombing planes. After 1919, when aeronautical activities were at low ebb, this company carried on considerable research work and built experimental planes. It has with within recent years developed a number of models for military and training purposes and introduced its light touring plane towards the close of 1928. The Breda 15 has participated at air meets both in Italy and foreign countries and has been quick to establish itself as a popular touring plane. Recently a Breda 15 piloted by Mario Rasini and powered by a DH Gipsy engine accomplished a noteworthy circuit of the Mediterranean.

The Breda light plane is a folding wing monoplane with an enclosed cabin containing two seats in tandem, the pilot being seated in the rear. It is convertible from a landplane into a twin-float seaplane and can be powered with any in-line or radial type air-cooled engine of 80 to 100 horsepower. Future planes, however, will be equipped only with the radial type motor.

The Breda is of wood and steel. The wing is in two sections which are attached to the upper fuselage longerons and which are externally braced by parallel tubular steel struts extending to the lower longerons of the fuselage. The wings may be folded by uncoupling the front bracing struts and being pivoted around the rear spar joints. The ailerons have narrow chord and extend nearly the entire span. They may be operated either simultaneously or differentially through the intermediary of a screw gear.

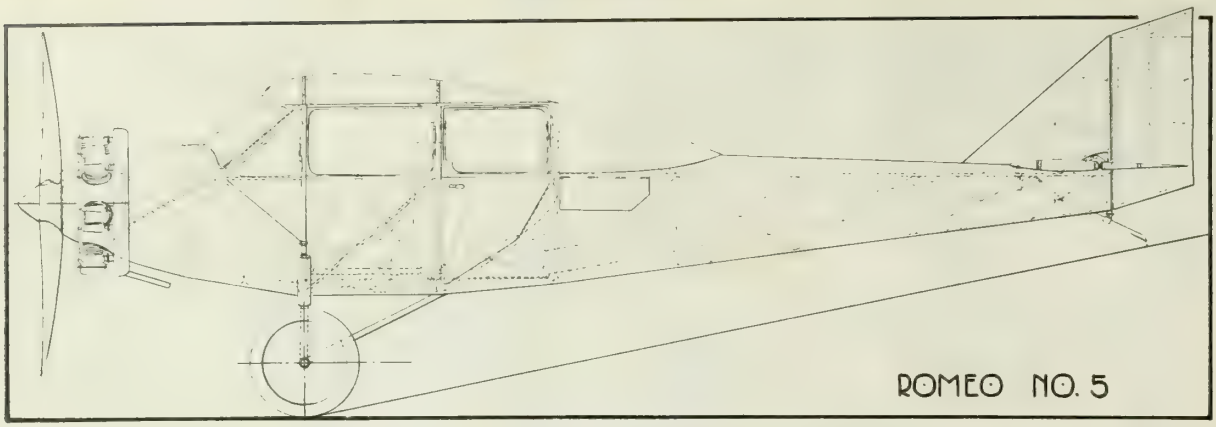
The fuselage has a rectangular section and contains a cabin forming the center section. The roof, sides and front consist of panels of non-inflammable, transparent material and may be opened. The seats are arranged for the use of parachutes, and dual control is provided, equipped with a Bowden cable. A separate door gives access to each seat. Behind the cabin, there is a small baggage compartment large enough for two suit cases. The empennage is of the monoplane type with a balanced rudder. The landing gear is of the cross-axle type, and the wheels are equipped with brakes, either one or both of which may be applied by the pilot, an interesting feature for light planes. The Breda 15 is equipped for night flying and is furnished with a generator and battery. The plane has a robust construction and under test has shown good stability. Its factor of safety is seven. The maximum speed is 112 miles per hour as a landplane and 99 miles per hour as a seaplane. The cruising range with a passenger is six hours.

Specifications

(Walter 85-horsepower engine)

	Landplane	*Seaplane*
Span	36 ft. 9 in.	36 ft. 9 in.
Length	22 ft. 2 in.	22 ft. 2 in.
Height	8 ft. 3 in.	8 ft. 3 in.
Wing area	204.4 sq. ft.	204.4 sq. ft.
Weight empty	924 pounds	1,036 pounds
Useful load	616 pounds	616 pounds
Fuel and oil	198 pounds	198 pounds
Pilot and passenger	352 pounds	352 pounds
Luggage	66 pounds	66 pounds
Weight loaded	1,540 pounds	1,653 pounds
Wing loading	7.5 lbs. per sq. ft.	8.1 lbs. per sq. ft.
Power loading	17.7 lbs. per h.p.	19.4 lbs. per h.p.
High speed	112 m.p.h.	99 m.p.h.
Minimum speed	37 m.p.h.	40 m.p.h.
Cruising speed	87 m.p.h.	87 m.p.h.
Service ceiling	13,120 feet	11,483 feet

(*Continued on next page*)



Side outline of the Romeo Ro. 5 with detachable cabin enclosure

(*Continued from preceding page*)

Climb to 3,280 feet	8 minutes	8 minutes
Cruising radius with passenger	6 hours	6 hours
Cruising radius without passenger	12 hours	12 hours

ROMEO Ro. 5

The Romeo Ro. 5 is a two-seater light folding wing monoplane the open cockpits of which can easily be enclosed by glazed panels. It is built by the Societa Anonima Officine Ferroviarie Meridionali, of Naples, a large industrial organization which manufactures railway equipment and the well-known Alfa Romeo automobiles. This company entered the aeronautical industry by building airplane engines and holds the license to manufacture Gnome-Rhone Jupiter engines, which are produced in Italy under the name of Romeo-Jupiter. In 1925 the firm acquired the license to build Fokker planes and created a department of aviation in its Naples plant. Under the direction of Nicola Romeo, an Italian senator and prominent engineer, this department produced several military types and recently designed a light touring plane known as the Ro. 5. The Ro. 5 proved its merit in the meet at Montecelio, and in the International Tour of Light Planes, last year, Romeo took fifth place and four of them finished within the first twelve.

The wing is of wood construction, having spruce spars and a fabric covering. Plywood reinforcement is used on the leading edge. The wing is externally braced by steel tube N-struts. The wing is composed of two outer sections joined to a center section over the fuselage. The wing may be folded by disconnecting the front strut from the undercarriage structure and then pivoting it on the rear Vee, the converging point of which is attached to a coupling on the bottom longeron. The long narrow chord ailerons extend over the entire span and are equipped with flap gear. The fuselage is built up of welded steel tubes and is covered with fabric and plywood. The two cockpits are arranged in tandem, and each is provided with doors. The seats, which are designed for the use of parachutes, are well arranged, with the pilot occupying the back seat. Dual control connected by the Bowden cable is installed. A small baggage compartment is placed behind the cockpits. The empennage, like the wings, is of wood construction and has a fabric covering. The landing gear is of the split axle type with a shock strut extending to the forward wing brace. The Romeo Ro. 5 can be powered with any radial or in-line air-cooled engine of 85 to 100 horsepower and has a maximum speed of 112 miles per hour. There are two fuel tanks of eighteen gallons capacity each installed in the thick wing; these give the plane a range of six and a half hours. The factor of safety is seven.

Specifications
(85-horsepower engine)

Span	36 feet 11 inches
Length	23 feet 3 inches
Span, wings folded	9 feet 10 inches
Height	6.8 feet
Wing area	205 square feet
Weight empty	882 pounds
Disposable load	617 pounds
Useful load	358 pounds
Total weight	1,499 pounds
Wing loading	7.17 lbs. per sq. ft.
Power loading	17.6 lbs. per h.p.
High speed	105-112 miles per hour
Minimum speed	37- 40 miles per hour
Cruising speed	93- 96 miles per hour
Take-off run	230 feet
Landing run	330 feet
Range of action	6½ hours
Service ceiling	16,400 feet

AERONAUTICA D'ITALIA (A. S. 1)

The Societa Anonima Aeronautica d'Italia, of Turin, is a branch of the Fiat company, well known as the manufacturer of Fiat motors and automobiles. The Aeronautica d'Italia builds a light two-seater monoplane known as the A. S. 1, which is usually powered with the Fiat A-50 seven-cylinder 85-horsepower radial type engine. The plane is built as an open-cockpit monoplane with two seats in tandem, the pilot being placed in the rear. It can, however, be easily converted into a cabin type by fitting glazed panels to the cabane struts over the fuselage.

The parasol wing is of wood construction with fabric covering and is not tapered in plan or form. It consists of two outer sections attached to a center section and is braced on either side by parallel duralumin



The Romeo Ro. 5 two-seater folding wing monoplane for touring purposes

struts extending to the lower fuselage longerons. The wing may be folded by detaching the forward struts and folding the wing back around the rear spars. The long narrow chord ailerons are balanced and extend over the entire span and have control features similar to other Italian light planes. The fuselage is of rectangular section and is of mixed construction, covered with plywood. The seats are arranged for the use of parachutes, and there is a centralized pressure fire extinguisher installed in the forward part of the fuselage. The empennage is of the monoplane type and is of wood construction except for duralumin members in the elevators and rudder. Tail surfaces are covered by fabric. The undercarriage is of the split axle type with shock absorber struts. Twin floats can be quickly substituted when the plane is to be used as a seaplane.

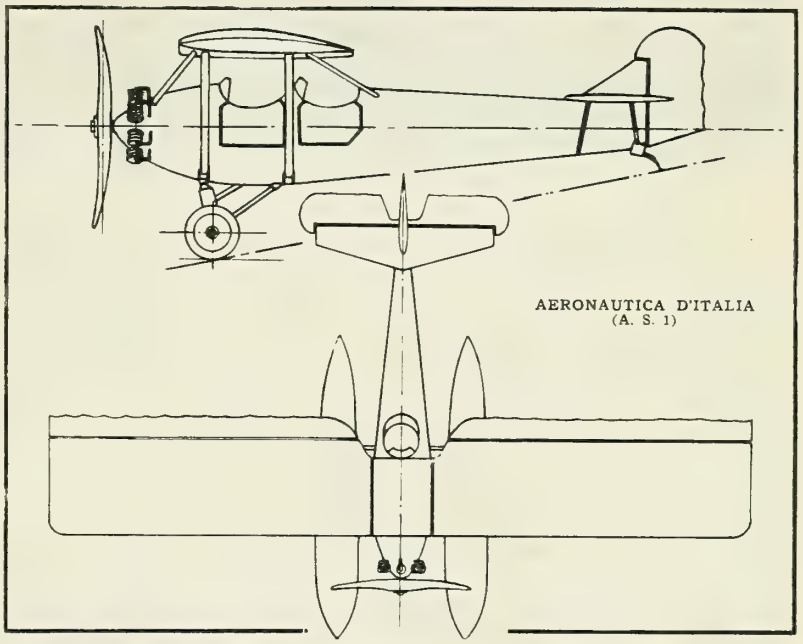
The Fiat A.S.1 is equipped with a twelve-volt generator which serves a small search light for night flying. The fuel tank has a capacity of forty gallons which is sufficient for a range of seven hours at cruising speed. Its maximum speed is 100 miles per hour and its factor of safety as a landplane is nine. The A.S.1 equipped with a Fiat 85-horsepower engine sells for 55,000 lira, equivalent to $2,894 in American currency.

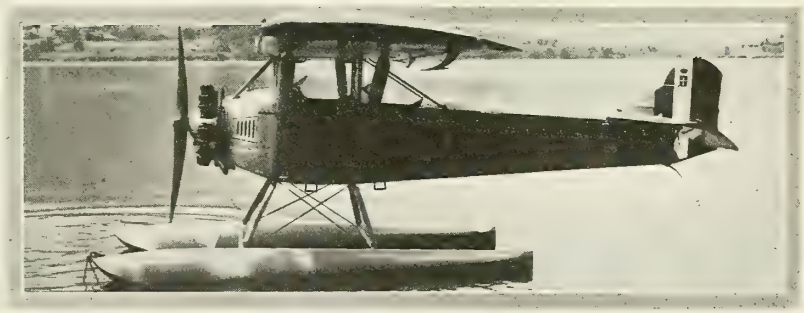
Specifications
(Fiat 85-horsepower engine)

	Landplane	*Seaplane*
Span	34 feet	34 feet
Length	20 ft. 7 in.	22 feet
Height	8 ft. 4 in.	9 feet
Chord of wing	5.7 feet	5.7 feet
Wing area	187 sq. ft.	187 sq. ft.
Weight empty	873 pounds	992 pounds
Disposable load	618 pounds	618 pounds
Total weight	1,491 pounds	1,610 pounds
Wing loading	7.9 lbs. per sq. ft.	8.52 lbs. per sq. ft.
Power loading	17.5 lbs. per h.p.	17.5 lbs. per h.p.
High speed	99 m.p.h.	95 m.p.h.
High speed (6,500 feet)	95 m.p.h.	90 m.p.h.
Minimum speed (1,600 feet)	43 m.p.h.	44 m.p.h
Take-off run	357 feet	
Landing run	377 feet	
Climb to 3,280 feet	5 min. 37 sec.	6 min. 15 sec.
Climb to 6,560 feet	12 min. 13 sec.	14 min. 10 sec.
Climb to 9,840 feet	21 min. 22 sec.	25 min. 30 sec.
Theoretical ceiling	19,686 feet	18,045 feet
Service ceiling	16,700 feet	16,076 feet
Cruising radius	7 hours	

(To be concluded next issue)







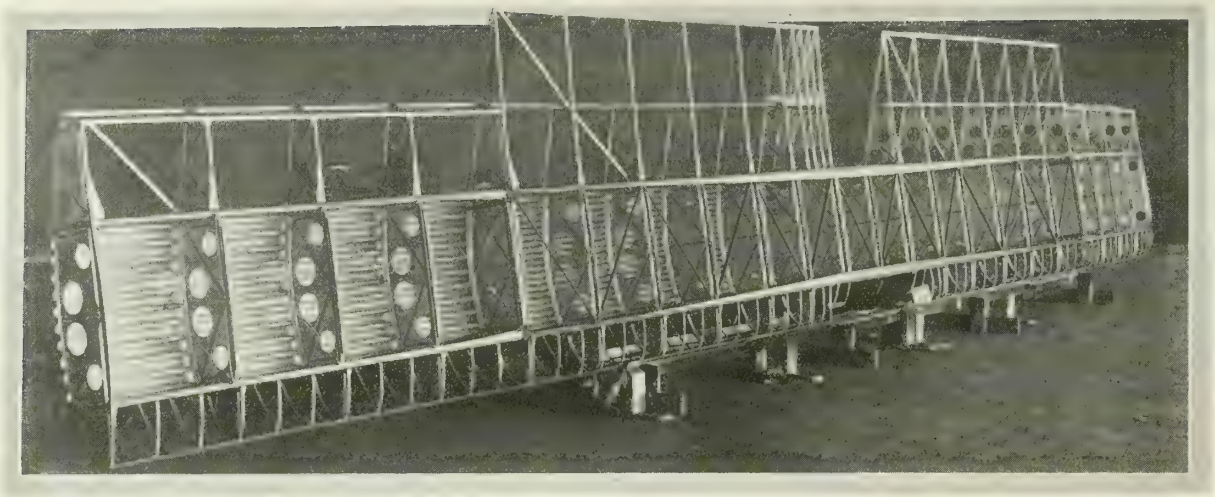
Landplane and seaplane arrangements of the A.S. 1

FIELD TESTS OF GOGGLES

FIELD tests of goggles made by E. B. Meyerowitz, Inc., of New York, were completed recently by the Meyerowitz company. These tests were made in several types of planes under various conditions of flight.

On a cross-country flight of 300 miles made during a heavy rain storm, the pilot testing the goggles reported that no discomfort resulted and that there was no leakage. The goggles were further tested on a cross-country flight of 600 miles at an average speed of 125 miles per hour and in an average temperature of nine degrees Fahrenheit. No discomfort resulted when the pilot testing the equipment held his head against the slipstream, no fluttering of the goggles was noticed and no increased tension of the goggle strap was required. The goggles fogged slightly during the first stages of the flight, this fogging being eliminated quickly by the use of ventilation.

Pilots using the Meyerowitz goggle and flying in several types of planes and under various conditions of weather at flying fields reported that no defects of the goggle were noticed with the exception of the locking arrangement, which was found to be not positive enough. When the goggles were tested by pilots in dives from an altitude of 10,000 feet and in speeds up to 250 miles per hour, there was no fluttering, no leakage, an increased comfort at high speeds, and good vision. These same results were obtained when the goggles were tested by pilots engaging in combat acrobatic maneuvers at speeds as great as 290 miles per hour.



BARLING NB-3 METAL WING

AN interesting design in metal wings is that of the Barling NB-3, the all-metal low-wing monoplane built by the Nicholas-Beazley Airplane Co., Inc. This patented wing is a rectangular full-cantilever type having a single twenty-foot center section, with six-foot tip sections completing the outer ends of the panel. This tip section, which is set at a five-degree dihedral, is so attached as to form practically a single section wing. The wing has no spars, but the body is made up of a series of box sections each about 11 by 24 inches. Sections are built up of duralumin sheets with the corrugations running lengthwise. Steel tubes are used for drift bracing in the lower part. The sheet is thickest at the center section of the panel where attachment is made to the fuselage. The box sections are rigidly and permanently braced.

To this series of center box sections are added suitable nose ribs forming the leading edge and triangular ribs forming the trailing edge. Ribs are standardized and uniform, being die stamped on heavy presses. The construction of the wings is simply a matter of assembling interchangeable parts. The correctness and accuracy of these parts, and therefore of the finished wing, is the result not of human skill but of the exactness of the steel tool dies employed.

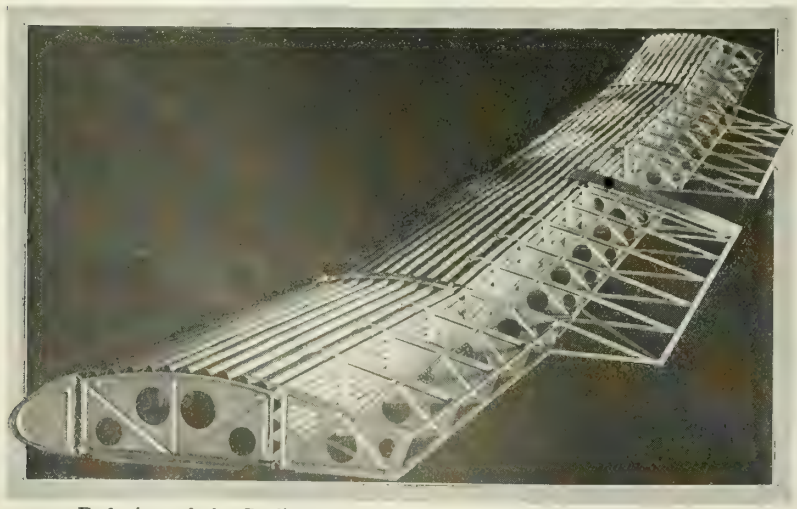
The bottom of the box sections is open, and no portion of the wing structure is concealed. Details are therefore easily handled during the assembling of the wing and accessible for complete and microscopic inspection upon completion.

In fifteen minutes the wing assembly is attached to the fuselage by four bolts without disturbing the landing gear. No rigging is necessary; however, provision has been made in both wing tips for wash-in or wash-out adjustment. Since all attachments on the plane are made up on jigs and fixtures, complete wing sets are interchangeable.

The complete NB-3 wing unit, covered and painted, weighs 1.18 pounds per square foot. The wing loading with the plane weighing its maximum of 1,373 pounds is only 8.6 pounds per square foot. The wing will carry a sand load of 48 pounds per square foot without bending, equal to a strength-weight ratio of 48 to 1.18.

In outlining the features of this type of metal wing structure, several advantages are claimed: In case of accident, metal yields, and by so doing the force is transferred to adjacent parts of the structure until the shock of the impact is absorbed. Instead of fracturing, metal bends and absorbs the shock of an accident, and the costs of repair are therefore reduced, for the material is more often deformed than destroyed.

With metal, deterioration and cost of maintenance are less during the life of the plane. Depreciation depends directly, of course, upon the length of time the ship is useable; this period cannot be accurately determined because metal airplanes are still a comparatively recent innovation. Planes of the Junkers and Ford type have been in use as long as eight years, even in tropical climates, without as yet having shown any particular reduction in their original efficiency or any indications of general deterioration.



End view of the Barling metal wing panel before being covered

TESTS OF SEVEN LARGE AIRFOILS IN THE N. A. C. A. WIND TUNNEL

N A. C. A. report 336 by Donald H. Wood gives the results of the tests of seven 2 by 12 foot airfoils (Clark Y, smooth and corrugated, Göttingen 398, N. A. C. A. M-6, and N. A. C. A. 84). The tests were made in the propellor research tunnel of the N. A. C. A. The Clark Y airfoil was tested with three degrees of surface smoothness. The effect of small variations of smoothness of an airfoil is shown to be negligible. Corrugating the surface causes a flattening of the lift curve at the burble point and an increase in drag at small flying angles.

Report 336 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

TODAY THE COLLEGE CAMPUS EXTENDS INTO THE SKY!



ALMOST every campus has its Seniors who've learned . . . and its Freshmen who are learning . . . to use their wings. And, under such able guidance as the Intercollegiate Aeronautic Association, college clubs from Boston to Berkeley are fast making Flying a major university sport.

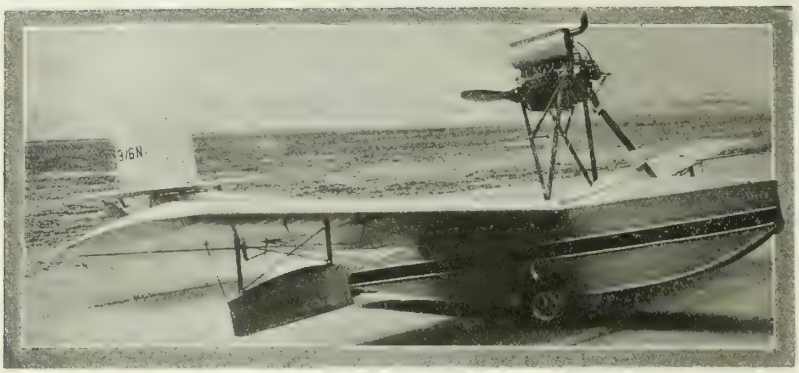
Today there are 40 of these Clubs—each with an average of thirty flying members. Harvard's is the oldest. Here ten student flyers and 25 licensed pilots keep the Club's Wright-powered plane almost constantly aloft. In fact, the "Whirlwind" has had over 200 flying hours in less than a year's time.

Yale's club, with 13 licensed pilots, also uses Wright-powered ships in training its 38 flying members. The club at New York University totaled 342 flying hours for its 20 licensed and 10 student flying members. And many of Michigan's 200 members regularly use Wright engines in that club's complete ground and flying divisions.

Wright is pleased that its "Whirlwind", "Cyclone", and Wright-Gipsy motors are being used as models at so many college Flying Clubs. And, knowing that they will continue to fly in later life, Wright asks all in Aviation to share in the constructive work of getting more students off the ground and up!

WRIGHT
AERONAUTICAL CORPORATION
PATERSON, NEW JERSEY
A DIVISION OF CURTISS-WRIGHT.

Say you saw it in AERO DIGEST



IRELAND "PRIVATEER"

THE latest model of Ireland Aircraft, Inc., Garden City, N. Y., is a low-wing pusher monoplane known as the "Privateer." It is produced either as a boat or as an amphibion and can be powered with a LeBlond 90 or a Wright Gipsy engine. The accompanying illustrations show it fitted as an amphibion with the Gipsy motor.

The hull has a wide, flat bottom which aids it in getting off the water with full load. The hull has a wood frame and the Alcad skin is held in place by countersunk machine screws through the longerons and stringers. The longerons are ash and the bulkhead and stringers are spruce. Three runners, or skags, are provided to protect the bottom in case the ship is used on runways or beaches. A single step with breathers is provided, but the shape of the stern gives the effect of a second step. The seating is side-by-side, and stick controls are standard equipment. Provision is made for dual controls if the ship is to be used for instruction.

An outrigger supports the tail well clear of the ground or water. This outrigger is of welded steel tubular construction, similar to a conventional fuselage, except that it has only three longerons. It is attached to the hull by three bolts and can be readily removed. It is fabric covered, and since it is water-tight, provides an additional buoyancy compartment in case the hull is punctured.

The engine installation is interesting in that, with the exception of the fuel tank, it is a complete unit. By disconnecting the fuel line and the landing wires and by removing three bolts, the engine, instruments, controls and motor mount may be hoisted out and set up on the hangar floor. The engine mount provides an excellent motor stand for all overhaul work except complete tear down. The power plant is provided with A. C. diaphragm pump which supplies the fuel from a twenty-five-gallon main tank in the hull. An auxiliary wobble pump is provided to get fuel to the carburetor for starting. The engine instruments consist of a chronometric tachometer, oil pressure gauge, oil thermometer and ignition switch. The three last mentioned are mounted on a Sampson strut in front of and between the pilot and passenger. Throttle and mixture levers are below these instruments. The tachometer is mounted at the top of the Sampson strut, with as short a drive shaft as possible to eliminate the jumping of the tach which usually occurs in boats on which long shafts are used. The motor is equipped with an Eclipse hand starter.

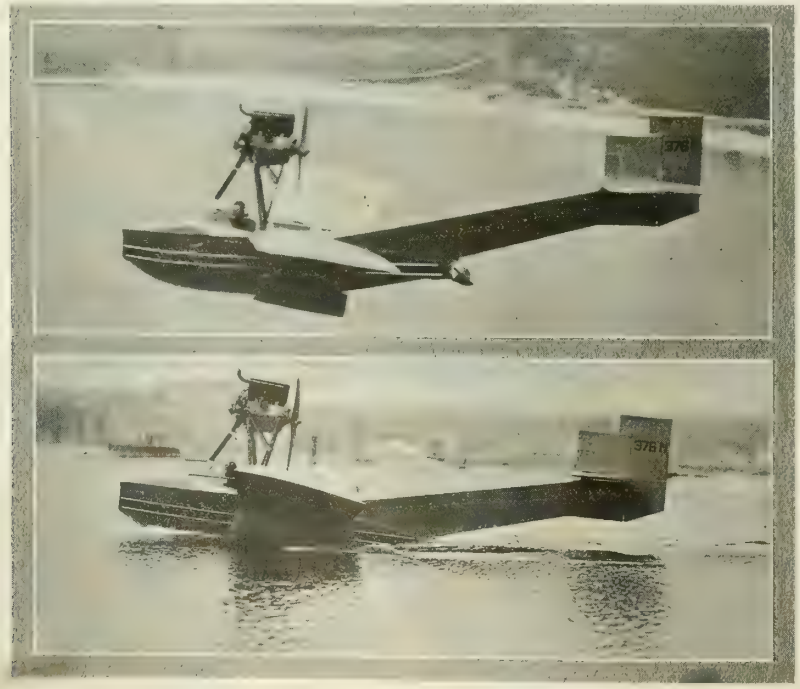
The landing gear is of interest in that it is made up of a double crank with an axle between, the loads being taken in bending and torsion on the cranks and in torsion on the axle. The raising of the landing gear is accomplished by pulling a lever which rotates the axle. One pull raises the wheels and locks them up; releasing the catch and letting the lever go forward allows the wheels to drops to the landing position where they lock automatically until the hoisting lever is again pulled. The complete operation of this gear takes less than a second. The wheels, which are provided with Goodrich low-pressure tires, rotate on stub axles on the lower ends of the crank. The entire landing shock is taken on the low-pressure tires, since no oleo or spring is included. Provision is made for independent brakes, which are optional equipment. If installed, the brakes are operated by a hand lever which can be placed in three positions. When it is up the brakes are off; when it is in the middle, the brakes work on the rudder bar, that is, right when the right rudder is applied; when the lever is down, both brakes are locked and will remain locked until the lever is raised.

The tail skid, which is attached to the rear of the hull, is steerable and is provided with fins to act as a water rudder.

The wings are built up of spruce spars, spruce and plywood compression struts and ribs of Allegheny metal. This is a non-corroding metal which requires no plating and has a high strength-to-weight ratio. Swaged wires are used for drag bracing. The same method of construction is used on the stabilizer and fin. All of the control surfaces are built of steel welded up. Chrome-molybdenum tubing is used for torque tubes, and the ribs are Allegheny metal welded in place. All of the surfaces are fabric covered in the conventional manner. Streamline wires are used for external bracing.

Another interesting feature is the stabilizer adjustment. The stabilizer may be adjusted on the ground in case any excessive loads are to be carried. This has not been found necessary since the first test flight. A pair of struts with an airfoil section run from the outrigger to the rear beam of the stabilizer. These are inverted, and an increase in angle causes a negative lift, thus acting in the same manner as a negative stabilizer. These struts are moved from

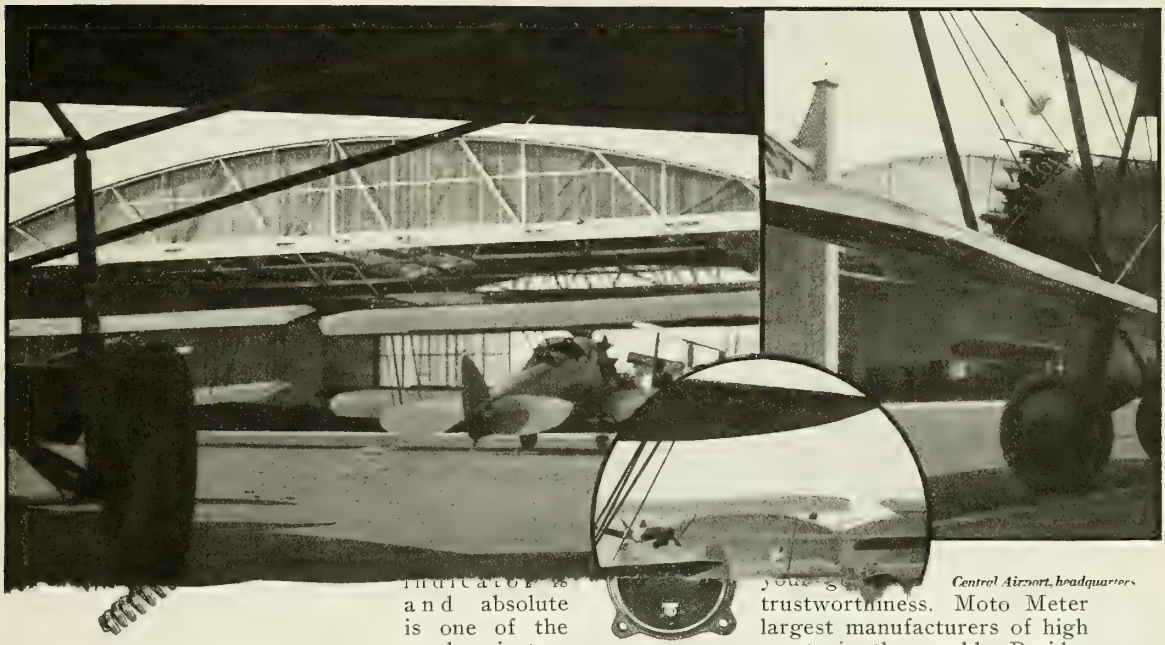
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The Ireland "Privateer" amphibion in flight and alighting

At the doorstep of 3,500,000 people

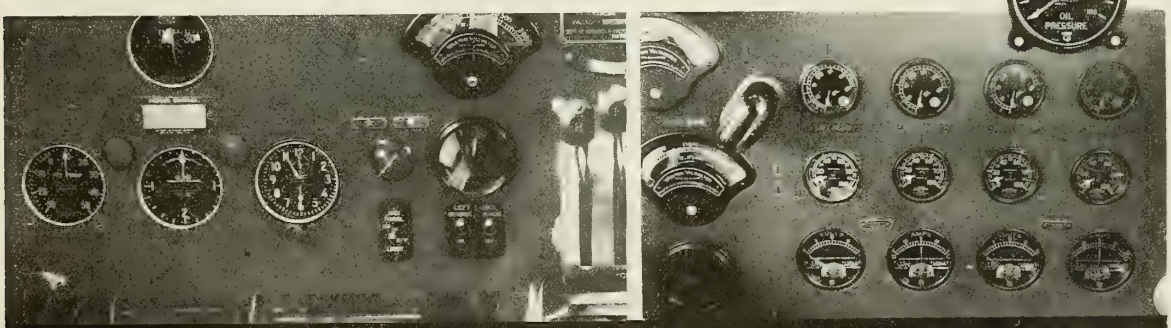
A logical center for the aviation industry



Central Airport, headquarters

Indicator is and absolute is one of the grade instruthe ice warning indicator Moto Meter also produces a number of other dependable and reasonable aviation instruments, such as heat indicators, oil and fuel pressure gauges, many of which are found on popular makes of planes, and many of which have done their part in making possible the record-breaking flights of recent years. Find out what these instruments can do for you. Write for free booklet "Aviation Instruments" *today.*

Below is a view of the instrument board in one of the new Western Air Express liners. The dial of the Ice Warning Indicator is in the lower left hand corner. No less than eight Moto Meter Oil and Fuel Gauges are visible on the right side of the panel.





MOTO METER

GAUGE & EQUIPMENT MOTOMETER CORPORATION

LONG ISLAND CITY, NEW YORK, U. S. A.

TOLEDO, OHIO LA CROSSE, WIS.

Factories at Long Island City . Toledo . La Crosse . Canada . England
France . Germany . Australia





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the cockpit.

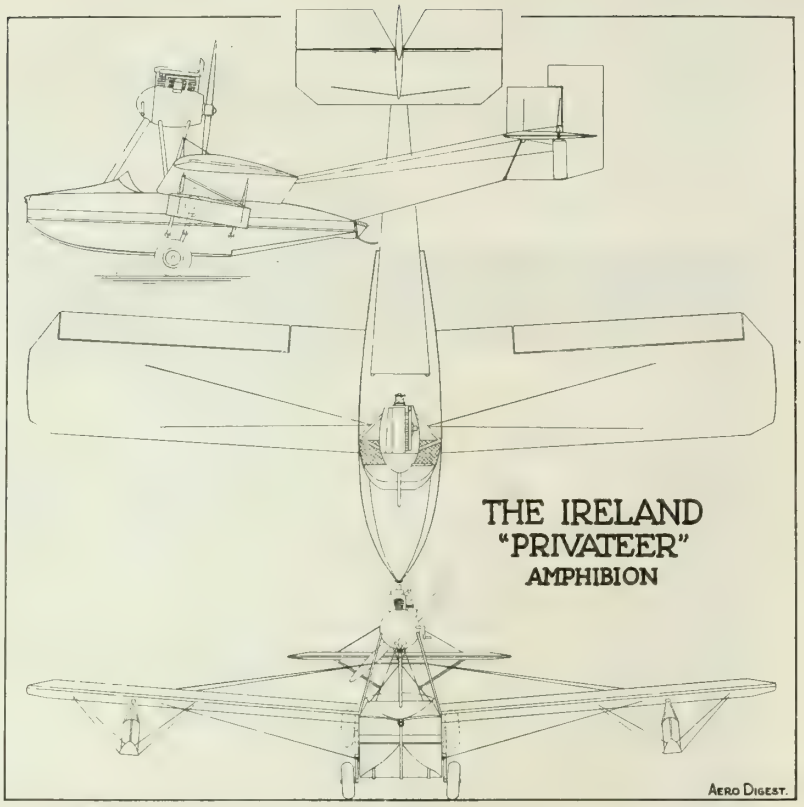
In the recent tests the ship has shown itself to be stable under various conditions of loading and flies smoothly and steadily "hands-off."

Specifications

Span	38 feet
Chord	72 inches
Length	28 feet
Height overall	8 feet 4 inches
Dihedral	5 degrees
Sweepback	3½ degrees
Incidence	4 degrees
Wing area (including ailerons)	198 square feet
Aileron area	29.3 square feet
Stabilizer area	28.8 square feet
Fin area	13.75 square feet
Rudder area	11 square feet
Weight empty (as a boat)	1,015 pounds
Gross weight (as a boat)	1,520 pounds
Weight empty (amphibion)	1,090 pounds
Useful load	505 pounds

Performance

High speed	81 miles per hour
Cruising speed	70 miles per hour
Landing speed	40 miles per hour
Clime	700 feet per minute
Cruising range	320 miles



runners, or skags, are provided to protect the bottom in case the ship is used on runways or beaches. A single step with breathers is provided, but the shape of the stern gives the effect of a second step. The seating is side-by-side, and stick controls are standard equipment. Provision is made for dual controls if the ship is to be used for

moving three bolts, the engine, instruments, controls and motor mount may be hoisted out and set up on the hangar floor. The engine mount provides an excellent motor stand for all overhaul work except complete tear down. The power plant is provided with A. C. diaphragm pump which supplies the fuel from a twenty-five-gallon

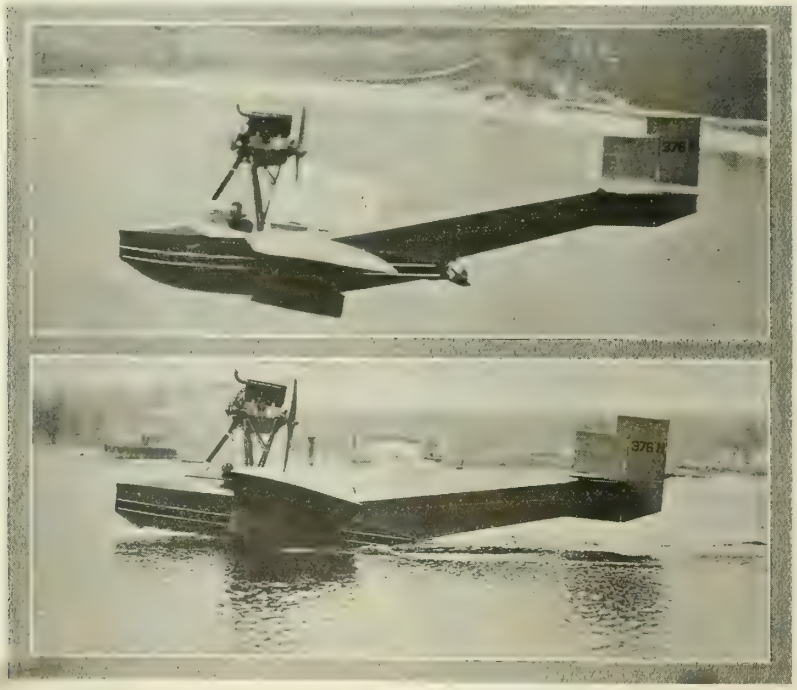
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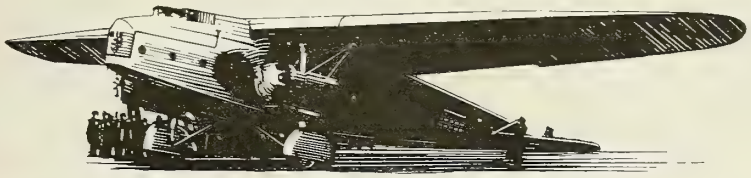
The wings are built up of spruce spars, spruce and plywood compression struts and ribs of Allegheny metal. This is a non-corroding metal which requires no plating and has a high strength-to-weight ratio. Swaged wires are used for drag bracing. The same method of construction is used on the stabilizer and fin. All of the control surfaces are built of steel welded up. Chrome-molybdenum tubing is used for torque tubes, and the ribs are Allegheny metal welded in place. All of the surfaces are fabric covered in the conventional manner. Streamline wires are used for external bracing.

Another interesting feature is the stabilizer adjustment. The stabilizer may be adjusted on the ground in case any excessive loads are to be carried. This has not been found necessary since the first test flight. A pair of struts with an airfoil section run from the outrigger to the rear beam of the stabilizer. These are inverted, and an increase in angle causes a negative lift, thus acting in the same manner as a negative stabilizer. These struts are moved from

(*Continued on next page*)



The Ireland "Privateer" amphibion in flight and alighting



HOW THE WESTERN AIR EXPRESS INSURES SAFETY





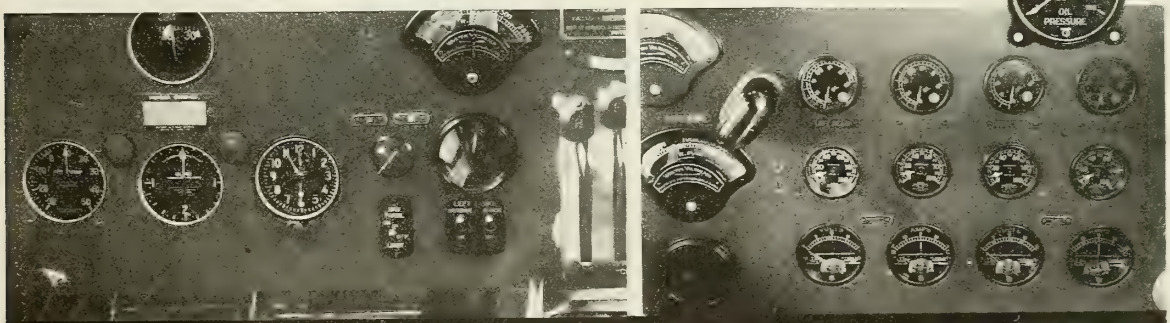
A view of the nose of the ship, showing how the temperature - sensitive element of the Ice Warning Indicator is installed.

THE huge new 32-passenger air liners of the Western Air Express are all equipped with Moto Meter Ice Warning Indicators. These beautiful and safe Fokker F-32's are the largest land planes ever built in America. The fleets of many other air transport companies also use Moto Meter Ice Warning Indicators. They take no chances with the big investment modern ships represent and with the precious human freight intrusted to them.

For of all the dangers that beset the pilot, ice forming on the wings is one of the most insidious. And to avoid ice the pilot must know exactly when the outside temperature has reached the critical point, where, if the atmosphere is saturated, ice is likely to form. The Moto Meter Ice Warning Indicator gives him exactly that knowledge. Its clear dial is connected with a sensitive feeler on the nose of the ship that instantly reacts to every change of outside temperature. The name MOTO METER on this indicator is your guarantee of excellence and absolute trustworthiness. Moto Meter is one of the largest manufacturers of high grade instruments in the world. Besides the ice warning indicator Moto Meter also produces a number of other dependable and reasonable aviation instruments, such as heat indicators, oil and fuel pressure gauges, many of which are found on popular makes of planes, and many of which have done their part in making possible the record-breaking flights of recent years. Find out what these instruments can do for you. Write for free booklet "Aviation Instruments" *today.*



Below is a view of the instrument board in one of the new Western Air Express liners. The dial of the Ice Warning Indicator is in the lower left hand corner. No less than eight Moto Meter Oil and Fuel Gauges are visible on the right side of the panel.





MOTO METER

GAUGE & EQUIPMENT MOTOMETER CORPORATION

LONG ISLAND CITY, NEW YORK, U. S. A.

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MOORE THREE-VALVE ENGINE

THE five-cylinder radial engine of the General Airmotors Company of Scranton, Pa., which is known as the Moore Three-Valve Engine, is of the four-cycle air-cooled type. This engine incorporates several interesting features, principal among which is the valve arrangement consisting of two intake valves and one exhaust valve.

The compression control mechanism provides for control of altitude adjustment, and by the operation of a spiral keyway in the altitude adjustment driving gear, the cylinder compression is automatically reduced. The compression can be varied from 1.5 to 5.4. With the compression lowered, the motor is easier to start, and in the air with the switches cut off, the propeller will revolve freely.

This engine, which bears Approved Type Certificate 36, has a cylinder bore of 4.75 inches and a stroke of 5.5 inches. At 1,880 revolutions per minute it develops 158 horsepower. Without propeller hub and flange, but including the magnetos and carburetor, it weighs 380 pounds or 2.4 pounds per horsepower.

The cylinders are forged carbon steel cupshaped blanks fully machined and ground. The head of the cylinder gives absolute contact with the aluminum alloy head, which is of the poultice type. The spark plugs are screwed into the cylinders instead of into the head.

The cylinder poultice head is a Bohnalite aluminum alloy casting with two intake ports and one exhaust port. Both the head and the cylinder are finned to radiate the heat generated in the cylinder.

A forged steel split clamp is used to fasten the the head to the cylinder. This clamp is constructed to permit expansion of the head as the heat increases in the cylinder.

The intake valves are of silchrome steel and have a diameter of one and five-eighths inches, and the exhaust valves of Kayser and Ellison heat-resisting steel are one and seven-eighths inches. The combined areas of the intake valves exceed the area of the exhaust valve.

The rocker arm assembly is simple. The parts are made of chrome nickel steel forgings and oscillate on three sets of ball bearings. The assembly is secured directly to the steel cylinder head with one bolt and has a support arm to the crankcase.

Push rods are of chrome-molybdenum tubing and are fitted with molybdenum hardened ball ends. One push rod activates the two intakes, a yoke being used. The exhaust push rods are fitted at both ends with hardened ball points. To permit quick and accurate adjustment, they are fitted at the crankcase end with special screws. Steel balls are fitted in the intake rocker-arm valve adjusting screws. The rocker arms are designed to receive a straight push action and thus relieve wear on the rocker-arm support. Valve tappet guides are of treated tool steel; rollers and tapets are chrome nickel steel.

The crankcase is of the split type. The front tapered nose is of clean design and extends for a distance of 8.5 inches from the cylinder radiations to the propeller hub. Free from accessories, it permits clean cowling to the fuselage, reducing head resistance.

In the rear crankcase are assembled all the mean driving gears, tappets, cams, etc. The rear crankcase also contains the induction chamber, fans, magneto plate, oil sump, valve mechanism, and all miscellaneous parts of the engine. The front and rear crankcase sections are held together with nine studs and lock nuts, in addition to cylinder studs and nuts on the periphery of the crankcase.

All gears, including the main gear, cam gears, magneto gears and oil pump gears, are made of treated chrome nickel steel. The cams are forged three-point carbon steel and are attached to an aluminum spider that revolves on two ball bearings at one-sixth crankshaft speed.

Pistons are of Bohnalite. They are of the slipper type, and with two compression rings and one oil ring, the total weight is less than two pounds. Oil escapement holes are drilled around the circumference of the piston. Piston rings are tubular, full floating, and move freely in the piston housing and connecting rod bearing.

The master rod is of the one-piece type, with full floating sleeve bearing on the crank pin. The articulating rods, as well as the master rod, are of H section and are made of treated chrome nickel steel. They are fully machined and polished.

The crankshaft is of the two-piece type made of chrome nickel steel, heat-treated, and fully machined. Oil passages are bored through the shaft, furnishing lubrication to the main bearing. The counter weights are of high-tensile bronze and are fitted and bolted to the crankshaft with three bolts. The crankshaft is supported by three large sets of ball bearings.

Because of the intake volume and high turbulence created by the method of valve construction, practically complete combustion takes place.

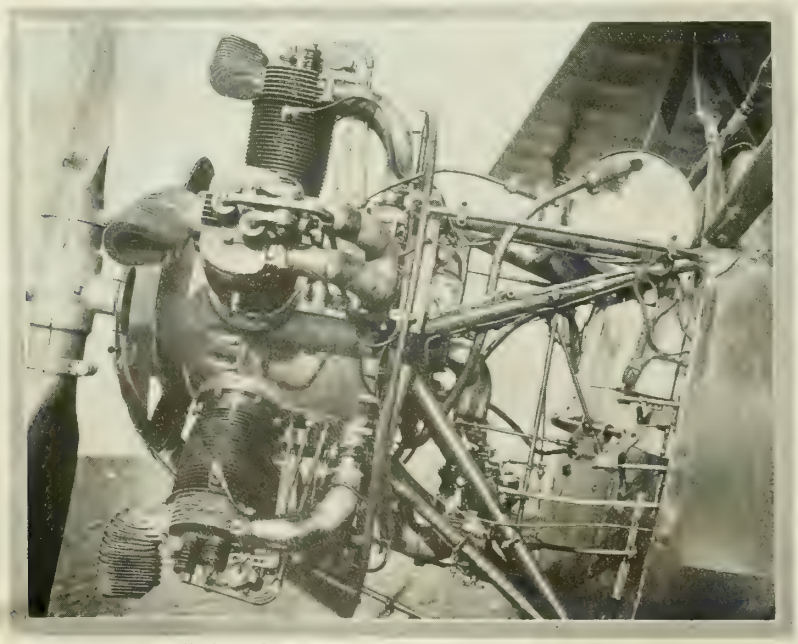
An aluminum alloy fan forces gas into the aluminum intake manifolds that are embodied in the rear crankcase. The intake manifolds are without angles, permitting a full flow of gas mixture, and are secured to the crankcase with a bronze clamp. The plate over the induction chamber and fan is cast aluminum alloy.

A brass pipe, 2.5 inches in diameter, passes through the main body of the oil sump and furnishes air to the carburetor air manifold. This pipe has a dual function; the air flowing through the pipe is automatically heated by the dropping of the hot oil on the external surface as it flows to the bottom of the sump; and conversely, the cool air passing through the intake pipe to the carburetor cools the inflow of oil as it enters the strainer for its return through the scavenge compartment of the oil pump and back to the oil tank.

A Stromberg NA-R5A carburetor is used

Lubrication is by the high pressure force-feed system. The oil pump is of the gear type, force and scavenge, with relief valve and drain to sump. The oil pressure gauge outlet is machined in the exact center of the crankshaft and in the direct path of the oil travel, thus insuring exact pressure in the crankshaft passage. Oil pump housing

(*Continued on next page*)



Installation of the Moore three-valve 158-horsepower engine



Climb . . . speed . . . responsiveness . . . strength . . . price

FAIRCHILD KR BIPLANES are made for the average man, not for the perfect pilot—because there are no perfect pilots. This average man may have many or few flying hours; he learned to fly easily, not because of some unusual special ability, but because it is easy to learn, and an interesting and swift way of getting about. He wants a ship that he can take off small or muddy fields with confidence rather than hope; one that will respond to all the demands he makes of it; and that is strong enough to stand the occasional hard landing. And finally, any ship he buys must match his pocketbook in purchase price and cost of operation.

In the two Fairchild KR Biplanes the average pilot has just such ships. They are unusually easy to fly, and highly responsive to the controls. They will climb at the rate of 800 feet per minute and better. The most rigid specifications are followed in design and manufacture. All welds are in shear, not tension. Chrome molybdenum steel is liberally used, for its extra strength combined with lightness.

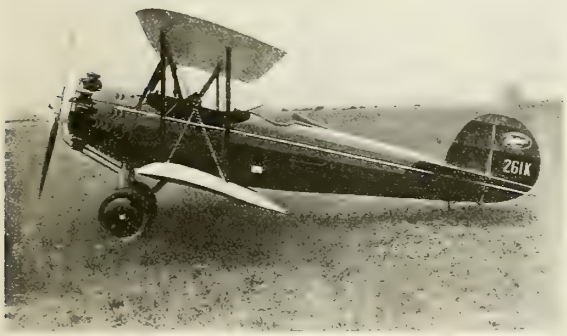
Particular attention is called to the new low price of the KR-21, now available in Trainer and Sportster equipment. Considering take-off, speed, maneuverability, sturdiness and completeness of equipment, these ships at their respective prices are unusually good buys. Note the completeness of the equipment, which means that the flyaway price can represent your entire initial investment. Illustrated booklet giving full information sent on request.

FAIRCHILD AIRPLANE MANUFACTURING CORP.
FARMINGDALE, LONG ISLAND, NEW YORK

Plants: Farmingdale, N.Y.; Hagerstown, Md.; Longueuil, P.Q., Can.

Export Offices: 122 East 42nd Street, New York City

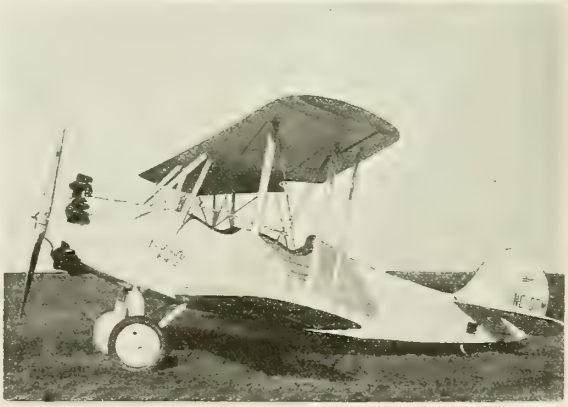
Division of The Aviation Corporation



FAIRCHILD KR-34 A.T.C. 162 Three place

Performance: Top speed, 123 m.p.h. Climb, 800 ft. p.m.
DISPOSABLE LOAD, 835 LBS.

Specifications: Wright J-6, 165 h.p. engine and metal propeller. Oleo landing gear. Bendix brakes may be installed at slight additional cost. Air wheels with brakes also obtainable at slight extra cost. Note really complete equipment: airspeed indicator, altimeter, compass, dash gasoline gauge, booster magneto, tachometer, dual controls, brakes, oil pressure and temperature gauges, cockpit covers, engine cover, logbook, tools, first-aid kit, fire extinguisher, engine instruction book, wired for navigation lights. This plane can also be had with 165 h.p. Comet engine, which alters performance slightly and increases disposable load and economy. Price, with either engine, $6575 flyaway Farmingdale.



FAIRCHILD KR-21 A.T.C. 215 Two place

Performance: Top speed, 113 m.p.h. Climb, 775 ft. p.m.
DISPOSABLE LOAD, 535 LBS.
KR-21 *Trainer*, $4125 flyaway Farmingdale

Specifications: Kinner 100 h.p. engine and wood propeller. Oleo landing gear. Bendix brakes may be installed at slight additional cost. Air wheels with brakes also obtainable at slight extra cost. Complete equipment: altimeter, gasoline gauge, booster magneto, tachometer, oil pressure and temperature gauges, dual controls, engine cover, tools, fire extinguisher, first-aid kit, engine instruction book, logbook, celluloid inspection windows at all control bearing points, detaching pan.
KR-21 *Sportster*, $4375 flyaway Farmingdale. Same equipment as the Trainer plus upholstery, extra oil pressure gauge, compass, airspeed indicator, propeller spinner and cockpit covers.

FAIRCHILD

KR BIPLANES

(Continued from preceding page)

is Bohnalite.

The rocker-arms are lubricated by the Alemite-Zerk system.

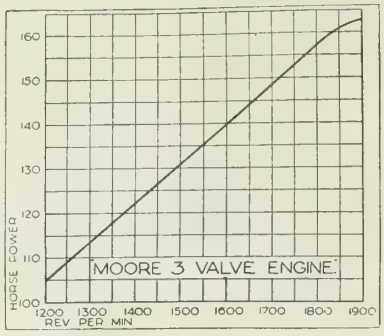
Ignition is furnished by two Scintilla magnetos, one revolving clockwise, and the other, counter-clockwise. The magnetos are mounted according to S.A.E. standard flange mounting. The magneto direct drive gears are helical, while all other gears used in this engine are spur type. The magneto couplings are splined to facilitate timing.

The magneto plate, of aluminum alloy, housing the magneto drive gears and magentos, also houses the oil pump gears, oil pressure gauge and carburetor. A mounting for the Heywood starter is furnished, installation being optional.

The tachometer gear, engine end, is machined integral with the oil pump driving gear shaft. The tachometer engine end connection is fastened to the oil pump plate housing.

Both the chrome nickel steel forged propeller hub and flange are machined and splined. The key and keyway are machined and fitted on the crankshaft.

A seven-cylinder engine of the same design will also be manufactured by the firm. On the basis of the power output of the five-cylinder engine, the seven-cylinder engine is expected to produce 250 horsepower. About eighty per cent of the parts will be interchangeable with the five-cylinder model. Standardization according to S.A.E. specifications will be followed throughout.



Power curve, Moore engine

Specifications

Bore	4.75 inches
Stroke	5.5 inches
Piston displacement	487 cubic inches
Horsepower per cubic inch	.32
Rated power at 1,880 r.p.m.	158 h.p.
Weight without propeller hub and flange	380 pounds
Weight per horsepower	2.4 pounds
Compression ratio	5:4
Fuel consumption	.50 pound per brake horsepower hour
Oil consumption	.015 pound per brake horsepower hour

RUSSIA'S FIRST TRIMOTOR

By PAUL E. LAMARCHE

THE Russian Soviet government's efforts to enter into the production of large transport planes has been strongly evident during the past year. The flight of the bi-motor monoplane *Land of Soviets* from Moscow eastward to New York attracted much attention. During the past summer a second Russian monoplane of a different type carried a Soviet air mission over Europe on a tour of the principal capitals, creating considerable interest in aeronautical circles. This second transport plane, which bore the name of *Wings of the Soviet,* carried eleven persons.

This transport plane is the first all-metal trimotor monoplane to be built in Russia and is known as the A.N.T. 3. It was designed by Professor Toupolief and constructed in Moscow. The Toupolief trimotor is of all-metal construction, a metal product known as Koltchugalumin being used throughout. This material is a light alloy that has a tensile strength of 56,906.64 pounds per square inch and all surfaces covered with this material have a thickness of 0.3 millimeter and are corrugated.

The plane has a cantilever wing which is in three sections, the center section extending a little beyond the two outboard engines, and the two other parts forming the wing tips. The center section is secured to the top of the fuselage by four bolts. The connections between the main wing section and the outer sections are of nickel chromium steel. In general construction the wing consists of four trussed spars which extend over the entire span, and a number of ribs set 39.37 inches apart. The whole is covered with Koltchugalumin sheet which is riveted to the spars and ribs.

The fuselage contains a cabin with nine wicker seats which are so arranged that five of them may be converted into berths. A toilet and lavatory is installed in the rear of the cabin. There are two spacious luggage compartments, one beneath the pilot's cabin and the other behind the passengers' cabin. The pilot's compartment is placed a little forward of the leading edge of the wing, contains two seats and is equipped with dual control. In construction the fuselage is made up of longerons of Koltchugalumin tube which is covered with corrugated sheet of the same material. It is composed of two frame units, the rear of the cabin constituting the second part. The structure of tail surfaces is likewise of Koltchugalumin tubing, covered with the same material.

The A.N.T. 3 is powered by three Gnome Rhone Titan air-cooled engines of 230 horsepower each, giving it a total of 690 horsepower and a maximum speed of 130 miles per hour. All three engines have detachable mountings and are secured by four bolts in each instance. The nacelles of the two outboard engines form a part of the center section of the wing. The plane carries eight fuel tanks distributed over the wing span and with a total capacity of 2,602 pounds. The largest of these are placed in the center section of the thick wing.

The landing gear is of the divided axle type. It is in the form of an inverted pyramid with the wheel at its apex and consists of three intersection members, two extending from points from the bottom of the fuselage and the third being an arm to which are attached the shock absorbers.

Specifications

Span	77 feet 8 inches
Length	55 feet
Height	15 feet 9 inches
Weight empty	7,375 pounds
Total weight	11,093 pounds
Maximum speed	130 miles per hour
Speed at 3,000 feet	124 miles per hour
Speed at 6,600 feet	119 miles per hour
Speed at 10,000 feet	113 miles per hour
Service ceiling	12,500 feet



Soviet Russia's first all-metal trimotored commercial airplane "Wings of the Soviet" or A.N.T. 3



THIS BIG T. A. T. plane is being jockeyed into starting position by a "Caterpillar" Tractor. Each T. A. T. field from Los Angeles, California, to Columbus, Ohio, is equipped with a "Caterpillar" track-type Tractor, nimble and powerful. With wide tracks that do not bite into the field's smooth surface and that have no fear of sand or dust or mud, the "Caterpillar" Tractor logically becomes the chore-boy on busy flying fields. Not only for handling ships, but for smoothing and rolling the field, the "Caterpillar" is endlessly useful about a modern airport.

Prices—f. o. b. Peoria, Illinois

TEN	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY	$2375
SIXTY	$4175		

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PEORIA, ILL. *and* SAN LEANDRO, CALIF., U. S. A.

Track-type Tractors Combines Road Machinery
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REG. U.S. PAT. OFF.
TRACTOR

A TAIL SPIN *by the* GROUND CREW - -

THADEN
TYPE T-4-A ALL-METAL MONOPLANE



THE Pittsburgh Metal Airplane Company of Pittsburgh, Pa., formerly the Thaden Metal Aircraft Corporation of San Francisco, recently completed its second Pittsburgh-made, all-metal monoplane.

This plane, a five-place cabin type, incorporates several interesting features, among which is the modified Clark "S" wing, which is the newest development of Colonel Clark's aerodynamic studies. This airfoil design is characterized by an elliptical shaped plan form of the wing and an elliptical taper in elevation from the root to the tip.

Other features of the construction are the monocoque fuselage and wing and the utilization of the corrugated skin not only to act as the covering, but to carry the load stresses as well.

This ship, known as the Thaden T-4-A, is equipped with a 300-horsepower Wright J-6 engine, has a top speed of 135 miles per hour, a cruising speed of 110 miles per hour, a landing speed of 59 miles per hour, a climb at sea level of 920 feet per minute, a service ceiling of 15,000 feet, and an absolute ceiling of 16,000. Its high speed cruising range is 650 miles.

The fuselage is of monocoque type built of duralumin tubing and covered with corrugated Alclad. The wing is of all-metal construction, built entirely of Alclad. The control surfaces are all-metal, elliptic form, with a ball-bearing control system.

The T-4-A is dual side-by-side control with all control cables and tubes running inside the wing and fuselage.

The cabin interior finish is of light walnut with tan leather to match. This color scheme is further carried out by tan broadcloth upholstering on the top and sides of the cabin. There is a large full-sized door on each side of the cabin and the forward-side windows, or pilots' windows, are equipped with a mechanism for raising and lowering. All seats are of Alclad construction, heavily cushioned. There is a large dust-proof baggage compartment in the rear, directly behind the passenger seat.

Fuel is supplied through a gravity feed system from two sixty-gallon tanks built into the wings. A gravity feed system is also used in engine lubrication.

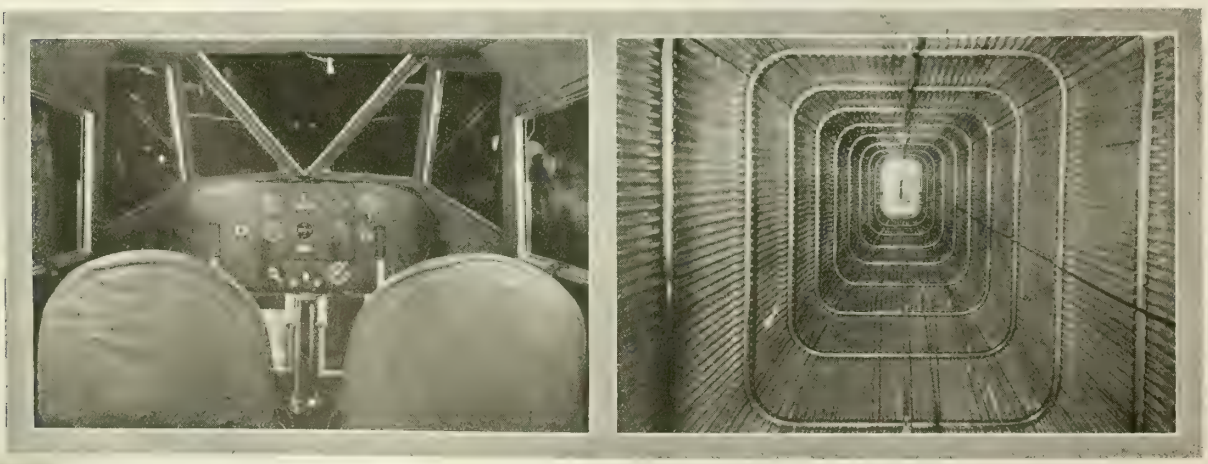
The engine cowling is of Alclad and is streamlined with the fuselage to offer minimum drag.

A nine-foot Standard Steel propeller is used in this ship, as well as Edgewater steel shock absorbers, Bendix brake wheels, and a Goodyear Musselman Airwheel, attached to a friction spring and turning on a 360-degree pivot, in place of a tail skid. An Eclipse inertia starter, cockpit type, is mounted in the lower part of the instrument panel and is easily accessible from either pilot's seat. Standard Pioneer instruments (compass, bank and turn indicator, altimeter, air speed indicator, engine tachometer, oil temperature gauge and oil pressure gauge, gas cock, primer and ignition switch) complete the dash board assembly. The arrangement of the latter is unique in that the flight instruments are grouped together on a removable panel which fits into the center of the dash. There are also small doors on each end of the dash board which makes it possible to reach the other instruments grouped around, but not a part of, the removable panel. These compartments may also be used as storage places for such equipment as maps, gloves, flashlights, etc. This ship is painted around the windows, leading edge of the wing, cowling and landing gear, with a two-tone blue, which gives it a blue and silver finish.

George R. Hann is chairman of the board, and Richard W. Robbins is president of the Pittsburgh Metal Airplane Company. Other officers include H. V. Thaden, vice president and general manager; Charles L. McCune, treasurer; and C. Bedell Monro, secretary.

Specifications

Span	45 feet
Height	8 feet 11 inches
Length overall	30 feet 10 inches
Chord at root	97 inches
Chord at tip	52.5 inches
Dihedral	2.5 degrees
Sweepback	2.1 degrees
Wing area (including ailerons)	274 square feet
Aileron area	26 square feet
Stabilizer area	26 square feet
Elevator area	16 square feet
Fin area	12.5 square feet
Rudder area	12.5 square feet
Weight empty	2,286 pounds
Disposable load	1,514 pounds
Gas	600 pounds
Oil	64 pounds
Pilot	170 pounds
Passengers	680 pounds
Gross weight loaded	3,800 pounds
Wing loading	13.88 pounds per square foot
Power loading	12.67 pounds per horsepower
High speed (sea level)	135 miles per hour
Cruising speed	110 miles per hour
Landing speed	59.0 miles per hour
Climb (sea level)	920 feet per minute
Cruising range	650 miles



Interior views of the Thaden T-4-A showing pilots' seats and the metal monocoque fuselage construction

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FOR dependable, low cost air transportation to meet the demand of speeding up modern business, aviation motors must of necessity have a high degree of efficiency. Wright makes sure of the reliability of their 300 H. P. J-6 Whirlwind motors by using 44 SKF Bearings on the vital locations.

It can truly be said that the hour after hour reliability... day and night... which SKF Bearings bring to Wright motors is something not based on first cost. Ultimate performance after hundreds of hours in the air is the deciding factor. Reasoning in this manner Wright finds that "the highest priced bearing in the world", is really the cheapest.

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That the manufacturers whose product is illustrated above preferred to pay more for their bearings and less for servicing or replacing them. They preferred to pay a higher price in the beginning than many times this higher price in the end. And, finally, they preferred to economize by using SKF bearings because they are made to do their job, not to fit a price list.

Say you saw it in AERO DIGEST

KEYSTONE-LOENING AIR YACHT

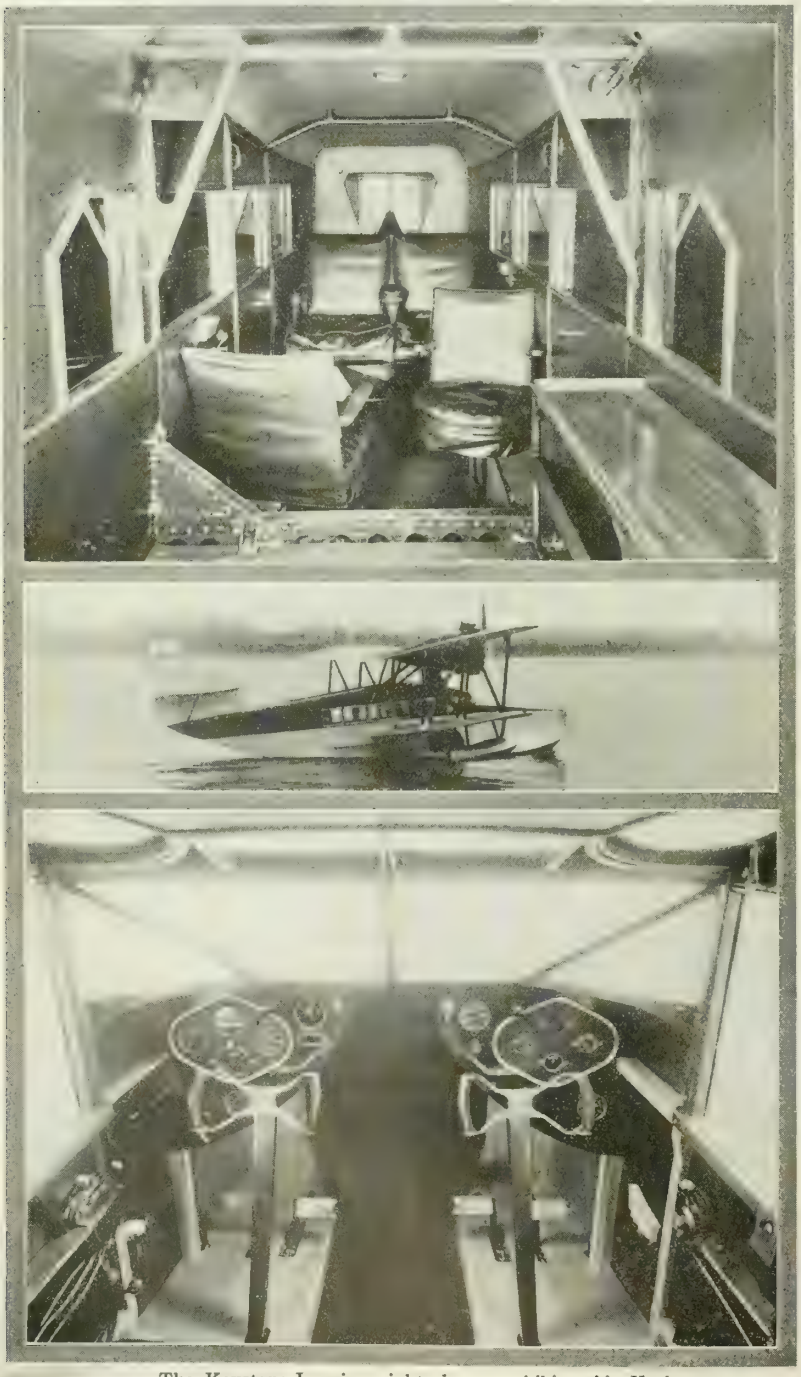
THE 1930 Keystone-Loening Air Yacht is an eight-place amphibion biplane powered with a 525-horsepower Cyclone or Hornet engine mounted on the upper wing.

The pilots' compartment is connected directly with the passengers' cabin and may be closed if the passengers desire. This cockpit may be entered by a hatchway at the front of the plane. Side-by-side dual controls are provided. The retractable landing gear is visible to either pilot at all times. This landing gear is operated by a crank located between the two pilots' seats and may be retracted or lowered in fifteen seconds. The visibility of the pilot is increased by mounting the engine on the upper wing. Standard equipment includes an Eclipse electric starter, a bronze anchor and 100 feet of anchor line, dual dep control and an illuminated instrument panel containing flight instruments for navigation and blind flying. The wings are wired for navigation lights.

The passenger compartment is thirteen feet long, about five feet in height, and three feet nine inches wide. Six passenger seats of the arm-chair type, mounted on swivels to permit a variety of seating arrangements with good visibility are provided. Space for baggage is located in the front of the cabin. Wash room facilities, which can be installed in the rear of the compartment, are optional.

The cabin is heated by the exhaust system, and the floor is carpeted. Dome lights located in the ceiling are provided. The compartment is furnished in cloth and leather and the windows grind up and down like automobile windows.

The hull of the Air Yacht is streamlined and constructed of wood members with metal fittings. The wings are fabric-covered and are of two-bay design with N-struts and polished streamline wires for interplane bracing. The wings are built of spruce spars and ribs of Alclad.



The Keystone-Loening eight-place amphibion Air Yacht

Specifications

Span	46 feet 8 inches
Chord	6 feet
Length overall	35 feet 8.5 inches
Height overall	13 feet 2 inches
Wing area	517 square feet
Weight empty	4,071 pounds
Useful load	2,229 pounds
Payload	1,149 pounds
Weight loaded	6,300 pounds
Wing loading	12.18 pounds per sq. foot
Power loading	12 pounds per horsepower
Gasoline capacity	140 gallons
Oil capacity	10 gallons
High speed	128 miles per hour
Cruising speed	100 miles per hour
Landing speed	55 miles per hour
Climb	850 feet per minute
Ceiling	13,800 feet
Cruising radius	550 miles

RADIO IGNITION SHIELDING

RADIO ignition shielding designed for use on aircraft to eliminate the interference of radio reception and transmission caused by the ignition system, has been developed by Breeze Corporations, Inc., of Newark, N. J. The shielding is known as the Breeze Radio Ignition Harness and was particularly designed to overcome the electrical disturbance emanating from the ignition wires leading from the magneto to the spark plugs.

The main shielding covers the entire ignition system from the magnetos to the spark plugs, including the manifold ring, housing for individual wires to the spark plugs and to the manifold from the magneto. An auxiliary shielding covers all ignition wires from the magneto to the booster magneto and switch. The company also provides shielded spark plugs for installation.



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STINSON AIRLINER

WITH the announcement of the Stinson Airliner, the Stinson Aircraft Corporation, of Wayne, Michigan, has entered the trimotor transport field. Previous to announcement, the first ship had been subjected to nearly a year of intensive flight-testing under conditions that would be met in operation. The Stinson Airliner, which is a ten-passenger ship, is said to have a good performance, being able to climb well under full load with only two engines operating. The adjustable fin, as well as stabilizer, makes it possible to trim the ship in flight. The fin adjustment takes care of one inoperative engine so that normal rudder action is unchanged. With one nacelle engine inoperative, turns can be made with or against the remaining nacelle engine. Stability is such that the ship can be flown using the rudder alone or the ailerons only.

Interchangeability of parts and accuracy of alignment are assured by the use of jigs and die system in the construction of the plane. The entire primary structure of the plane is of metal, completely fabric-covered. Metal cowling is used on the nacelles and the center engine compartment back to and under the pilot's cockpit. The fuselage is of welded chrome-molybdenum steel tubing, Air Corps specifications. No brace-wiring is used. Welded steel tube wing spars of the truss type, together with square duralumin tube ribs and metal leading edge, comprise the wing structure.

Strength factors required by the Department of Commerce are exceeded and all major parts have been subjected to actual load tests, including extensive tests on the wing spars, ribs and fittings and sand-loading of the control surfaces.

The cabin door is large and the cabin entrance close enough to the ground to allow easy access without steps. In the cabin interior there is ample room in the aisles. Seats for the passengers are double arm chairs, which are spaced thirty-eight inches apart. Deep, tufted upholstering is used throughout the cabin. The cabin floor is covered with a removable carpet. Large-size windows with winding regulators allow the passengers adequate ventilation without excessive inflow of air.

The pilot's cockpit contains two seats, adjustable fore and aft and up and down. The side-by-side dual wheel control operates through a chain and cable mechanism over ball-bearing adjustable pulleys, completely hidden, and yet accessible for inspection. Dual swing type rudder pedals are installed with separate control foot-brake pads which are on the pilot's side only.

All fuel line valves are located on the floor slightly under the pilot's seat. On the instrument board is a complete set of flying and engine instruments, together with electric starter buttons, primers and throttles of the lever type. The instruments for the center engine and all three switches are mounted in front of the pilot; the throttle and mixture controls are centered on the board. The flight instruments consist of air speed indicator, altimeter, turn and bank indicator, and rate of climb meter. The engine instruments for each outboard engine are mounted on the side of the nacelle readily visible to the pilot. All instruments are of the luminous face type for night flying, and two instrument lights on the main board and one light on each of the nacelle boards are operated by a rheostat mounted on the main board.

The stabilizer and the fin adjustment cranks are located at the top of the cockpit. To the left and below these are the landing light adjustment handles which rotate the landing lights to the angle desired inside the wing. Switches for the navigation lights and landing lights are mounted on a panel adjacent to and on the left of the pilot's seat.

A pressure fire extinguisher with three separate lines, one leading to each engine compartment, is mounted in the center engine mount in front of the cockpit wall, with the control handle extending into the cockpit readily accessible to the pilot. By this means all engine compartments can be flooded at any time from the cockpit. A hand fire extinguisher is located behind the pilot and is easily available for use by pilot or passengers. In the aft part of the ship is the baggage and mail compartment which also houses the battery, tools and engine covers.

Elevator and aileron controls are of the push-pull rod type and are inside the covering with inspection plates at important points in the system. The rudder controls are cables operating through separate tube housings. The electrical wiring through the wings runs through a shielding tube. Behind the rear wall of the cabin is located a lavatory with large entrance door opening into the cabin.

A single screw stabilizer adjustment of proved type is employed and allows a fine setting for leveling off in the air. The adjustable fin counteracts the turning moment set up by the unbalanced thrust of the outboard engine in case one engine becomes inoperative and the large rudder allows turning against the live engine.

The thrust line of the three Lycoming radial engines is in the same horizontal plane. The exhaust stack from the center engine collector ring extends back to the rear of the cabin; the nacelle engine exhaust is released through the outer side of each nacelle in order to decrease the exhaust noise reaching the cabin. Each engine unit is removable by taking out four bolts and disconnecting the control and fuel lines. Interchangeable oil tanks are mounted directly on the engine mounts.

Adjustable metal propellers are standard equipment. Bendix wheels and brakes are standard, and Aerol shock struts are used both for the landing gear and tail wheel shock units.

Specifications

Weight empty	5,400 pounds
Useful load	3,000 pounds
Payload	1,950 pounds
Gross Weight, loaded	8,400 pounds
Span	60 feet
Height overall	10 feet 4 inches
Length overall	38 feet 10 inches
Wing chord	105 inches
Wing area	490 square feet
Gasoline capacity	156 gallons
Oil capacity	16.5 gallons
High speed (sea level)	135 m.p.h.
Landing speed (sea level)	55 m.p.h.
Cruising speed (1,750 r.p.m.)	118 m.p.h.
Rate of climb (first minute)	1,200 feet
Rate of climb above 1,200 ft.	900 ft. per min.
High speed (2 engines)	108 mi. per hr.
Rate of climb (2 engines)	500 ft. per min.
Normal cruising range	520 miles

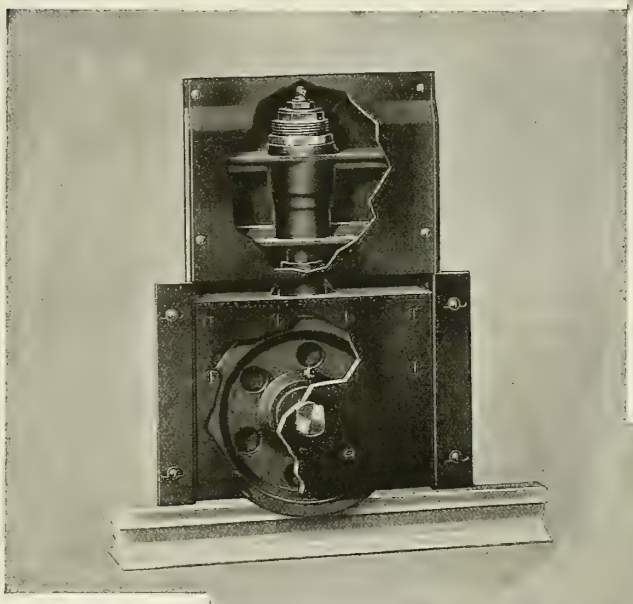
SPARK PLUG TERMINAL

A LOCKING spark plug cable terminal for aircraft engines has been devloped by the Tiffany division of the Connecticut Telephone and Electric Corporation of Meriden, Conn. The terminal is equipped with phosphor bronze jaws which form the contact with the spark plug, the contact being locked by a hinged bale which swings down across the end of the terminal.

Hangar doors slide smoothly and easily

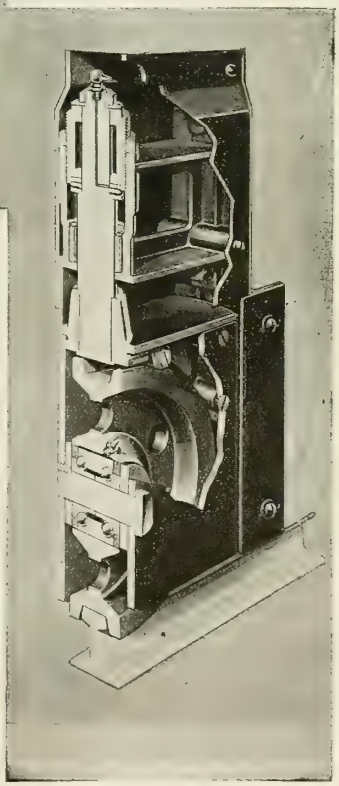


The R-W top guide roller



"Quality leaves its imprint"

R-W bottom rollers fit standard (12" x 20") slots on steel and wood doors. R-W bottom roller No. 574 for "round-the-corner" hangar doors is shown. Side plates are integral units with no springs or other intricate parts to break or get out of order.



on R-W hardware-

Correct engineering is just as essential for ground equipment as for flying equipment. Profits in aviation depend on both.

R-W hardware insures continued smooth, easy, trouble-free performance of hangar doors, because R-W hardware is specially engineered to do that particular job.

R-W rollers are ball bearing, Alemite-equipped and weather-stripped. They are designed for corner tubular, structural steel, and heavy wood doors weighing up to 3000 lbs. each. Specify R-W equipment for "round-the-corner" doors and for straight sliding doors. Have an R-W engineer cooperate with your door manufacturer. Use freely the experience and knowledge of the R-W engineering staff, comprised of recognized doorway specialists. Write for folder F-62 featuring R-W hangar door hardware.

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JUNKERS FIGHTER

THE Junkers K.47, which is built by the A.B. Flygindustri in its plant at Limhamn, Sweden, is a high performance two-place fighter of all-metal construction. It is primarily designed for pursuit work but, with its armament and high performance, can be used effectively as an interceptor fighter. The use of the low-wing monoplane for military work has gained much favor among European nations within the past few years, and such low-wing types as the Vickers interceptor single-seat fighter recently developed in England and the new Bernard "Jockey" in France show a tendency towards developing such types for pursuit work. The K.47 has been designed by the Junkers technicians as a purely military model, and it has been well equipped to serve this purpose.

This new Junkers military machine, with its supercharged Bristol Jupiter engine, has a maximum speed of 175 miles per hour at an altitude of 13,100 feet and can climb to 24,600 feet in twenty-five minutes and five seconds. Though adhering to the characteristic Junkers constructions, the plane embodies several variations. One of these is in the covering of the fuselage which has a smooth surface instead of the usual corrugated duralumin sheet used on Junkers types. This has enabled the constructors to reduce the weight and at the same time reduce resistance. The weight empty of the K.47 is 2,315 pounds which compares very favorably with the weights of various high performance military monoplanes or biplanes with fabric covered wings and fuselages.

The wings of the plane are attached to wing roots which are integral with the fuselage and which extend out from a point near the mid-section of the fuselage. The construction consists of six spars in duralumin tube which are united by a duralumin lattice form. The whole is covered by corrugated duralumin sheet. The wing is externally braced on both sides by oblique struts reaching to the landing gear and has a safety factor of twelve. Should this external bracing be shot away during combat, the wing becomes a cantilever wing and because of its structure is able thus to maintain a margin of strength which corresponds to the index four of static test of the airplane at the total weight of 3,605 pounds.

The fuselage is of oval section and consists of three parts: the engine section, the section containing the two cockpits, and the tail section. The fuselage is built up of longerons in duralumin profile which are braced by cross pieces of the same material. As mentioned, the fuselage has a covering of uncorrugated duralumin sheet. The forward part carries an easily detachable engine mount, and the center section of the fuselage contains two cockpits in tandem. Between the two cockpits there is a large, well streamlined headrest which not only protects the pilot from the slipstream, but acts as a wind breaker for the machine gunner in the after cockpit. This headrest is built high enough to protect both occupants in the event of an upset during ground maneuvers and has been sufficiently reinforced to withstand such a shock.

The horizontal empennage is of the monoplane type and consists of a fixed plane that is built into the upper part of the tail and an unbalanced one-piece elevator. The angle of incidence of the stabilizer can be adjusted in flight. The vertical empennage consists of two fins and balanced rudders. Both units of the vertical empennage are out of the slipstream and are so arranged as to allow the gunner in the after cockpit a wide firing range towards the rear. They present, however, one disadvantage in that the plane does not maneuver as well on the ground; but to overcome this handicap future planes will be equipped with wheel brakes and a tail wheel.

The K.47 is powered with a Bristol Jupiter VII supercharged air-cooled engine which develops 420 horsepower at 11,500 feet altitude and has a compression ratio of 5-to-3. The new plane is also adaptable for use of the Salmson 500-horsepower engine, the Lorraine 450-horsepower engine, the Pratt and Whitney Hornet 525-horsepower engine or the Armstrong Siddeley Jaguar 425-horsepower engine. There are two fuel tanks in the wing roots which have a total capacity of 84.5 gallons, sufficient for two hours flight. Both of these tanks can be dropped. Fuel is forced to the engine by means of a mechanical pump. There is also a hand pump installed in the pilot's cockpit. The oil tank has a capacity of 37 quarts and the engine has a compressed air starter.

The landing gear consists of a rectangular frame of steel tubes. It is of the cross-axle type with two Vickers oleo-pneumatic legs. At the lower extremities of the shock struts radius rods are attached, to which in turn are attached rigid Vee struts that are interconnected by another cross axle. From these rigid Vee struts the wing bracings extend to the mid-sections of the two wings. The tail skid is steerable and is of the Vickers oleo-suspension type.

The armament of the Junkers K.47 consists of two fixed machine guns, installed in the pilot's cockpit. These guns shoot forward and have loadings of 1,000 shots each. The machine gunner in the after cockpit has his back to the pilot and fires a machine gun mounted on a balanced support. He can shoot while seated, and his seat forms a part of the support for the gun, being of the type known as the rocker seat. This plane seems to offer unusual protection for the machine gunner in that only his head extends beyond the top of the fuselage and he is protected from the slipstream by the headrest. Moreover, his seat that is designed for a parachute. When shooting from left to right his range amounts to eighteen degrees and when shooting in a vertical angle his range may be varied by ninety-three degrees (ninety degrees above the horizon and three degrees below) because of the particular form of the fuselage and the arrangement of the vertical tail units.

Specifications

Wing span	40 feet 6 inches
Length	28 feet
Height	8 feet 6 inches
Maximum wing chord	7 feet 4 inches
Wing area	245.3 square feet
Weight empty	2,315 pounds
Weight of crew and accessories	450 pounds
Weight of armament	278 pounds
Total weight	3,605 pounds
Wing loading	14.6 pounds per square foot
Power loading	8.5 pounds per horsepower

Performance

Maximum speed (3,000 feet)	150 m.p.h.
Maximum speed (9,900 feet)	180 m.p.h.
Maximum speed (11,200 feet)	178 m.p.h.
Maximum speed (13,100 feet)	175 m.p.h.
Landing speed	65 miles per hour
Climb to 3,280 feet	2 minutes 2 seconds
Climb to 16,400 feet	11 minutes 7 seconds
Climb to 19,680 feet	15 minutes 7 seconds
Service ceiling	26,600 feet
Absolute ceiling	27,560 feet
Range of action	2 hours



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THE time lost in hunting for scattered items necessary to treat a wound, may mean the development of serious results from a simple abrasion or cut.

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makes it the ideal dressing for minor injuries.

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WESTERN NEWS

LOS ANGELES AIRPORT OF W. A. E. DEDICATED

DEDICATORY ceremonies of the airport constructed by Western Air Express at Valley Boulevard, Los Angeles, Calif., at a cost of $1,000,000 were held on April 17, the fourth anniversary of the beginning of air transport operations of the Western company. A crowd of more than 60,000 attended the ceremonies. An aircraft exhibition at which over thirty airplanes were displayed in addition to aeronautical accessories was held April 17-19 in one of the airport buildings in conjunction with the dedication of the field and the anniversary of the company.

The ceremonies included addresses by George Lord, general passenger agent of Western Air Express, and Governor C. C. Young of California; a program of musical entertainment furnished by a fifty-piece band during the ceremonies and the three-day aircraft exhibition; an aerial display including a flight over the airport made by the Goodyear blimp *Volunteer;* and the dedication of a thirty-passenger trimotor Fokker F-32, one of the five planes of this type recently delivered to the Western company by the Fokker Aircraft Corporation of America, Inc. These planes have been placed into passenger service by Western Air Express between Los Angeles and San Francisco. William May Garland was master of ceremonies.

The airport is privately owned and will be used by Western Air Express for its operations. The buildings which have been constructed at the field by the company include a service hangar with a floor space of 54,000 square feet, a storage hangar with a floor space of 36,000 square feet, a passenger depot constructed at a cost of $100,000, machine shop power plant, and a garage which will accommodate seventy-five automobiles. An additional hangar for storage purposes and a garage will be erected according to present plans.

Planes of Western Air Express fly a total of 14,000 miles daily over routes located in more than twelve states. Planes operated by the company have flown approximately 5,000,000 miles without a fatality during four years of scheduled air transport operation.

Pickwick Latin American Airways Suspends Serice to Mexico

APPROVAL by the Mexican Government of a temporary suspension of triweekly plane service of Pickwick Latin-American Airways linking Los Angeles, Calif., with Mexico City, Mexico, and, through other airlines, with Central and South America, was recently announced by Charles F. Wren, president of the Pickwick Company. The suspension is effective April 23, and will remain in effect pending the results of legislation now before Congress appropriating funds for maintenance and expansion of the foreign air mail service of the United States, and the efforts of the Pickwick company to obtain a foreign mail contract.

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Second Annual Air Meet to be Held at Tracy, Calif., May 24-25

THE second annual air meet at Tracy, Calif., will be held May 24-25, according to a recent announcement of officials of the James McDermott Post, American Legion, sponsors of the show. The meet was formerly scheduled to be held May 10-11, the date having been changed to avoid a conflict with an air meet which will be held at Napa, Calif., May 10-11.

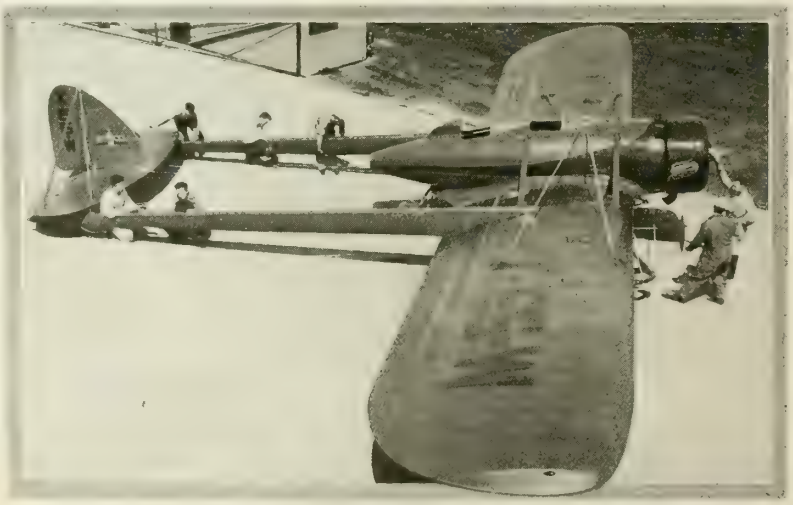
Airplane speed races will be included in the program of activities of the Tracy air meet and events will be arranged for various types of ships. A glider meet will be held in conjunction with the races and a prize will be awarded for the longest glider flight according to present plans. Acrobatics will be performed by planes participating in the meet. The Shell Oil Company will exhibit a Lockheed Sirius plane manufactured by the Lockheed Aircraft Corporation. William Johnson is chairman of the committee in charge of the Tracy air meet.

FLYING WING BUILT BY EMSCO AIRCRAFT

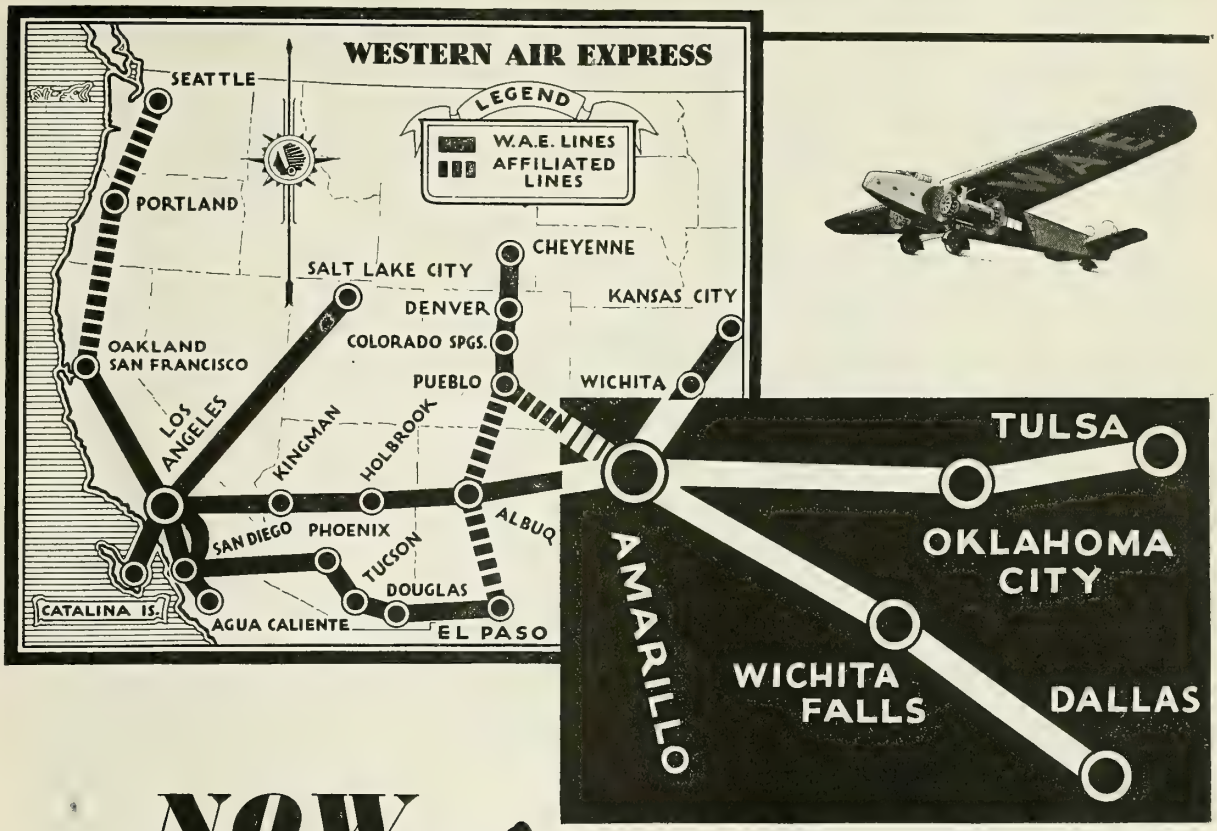
CONSTUCTION of a "Flying Wing" which will be used in attempts to establish a new world's non-refueling endurance record and a new world's distance record for continuous flight, has been completed by the Emsco Aircraft Corporation, of Downey, Calif. Following the non-refueling endurance flight the plane will be shipped to the Orient where it will undertake a flight from Tokio, Japan, to Seattle, Washington, a distance of 4,955 miles all over water.

The Emsco Flying Wing has a wing span of sixty feet and a chord of nine feet. The wing curve is designed to give maximum lift. The plane has no fuselage but the cockpits are arranged in tandem on a nacelle form of structure above the wing. At the forward end of this nacelle the engine is mounted, the nacelle terminating aft of the trailing edge of the wing. The tail surfaces are placed on two all-metal outriggers which extend from the wing aft. The entire plane is streamlined and has no struts. The Emsco Flying Wing has a gasoline capacity of 875 gallons. Six tanks with a total capacity of eight hundred gallons are built in the wing, and a single tank holding seventy-five gallons of gasoline is located

(*Continued on next page*)



The Flying Wing Developed by the Emsco Aircraft Corporation



NOW

Two More Western Air Express Lines to Serve the West

Adding two thousand miles to its great network of airlines, Western Air Express now provides swift, dependable air transportation between Amarillo, Oklahoma City and Tulsa and between Amarillo, Wichita Falls and Dallas.

WHEREVER you wish to go in the west there is a Western Air Express line to serve you. In four swift years this greatest of all American air transport companies has built a veritable railroad system in the sky... linking every large city in the west.

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The full story of the immense facilities of Western Air Express for dependable air travel will be gladly given you by leading hotels, travel bureaus, steamship or railway ticket offices, or inquire Western Air Express Offices, Graybar Bldg., New York City; Palmer House, Chicago; Kansas City and Los Angeles.

WESTERN AIR EXPRESS

(Continued from preceding page)
in the front of the forward cockpit in the nacelle.

The power plant is a Wasp Junior 300-horsepower engine, interchangeable with a Wasp engine of 450 horsepower without altering the streamlining of the nacelle. The 450-horsepower engine will be used in the attempts to establish new distance and endurance records.

SACRAMENTO AIRPORT DEDICATION HELD

CEREMONIES dedicating the Sacramento Municipal Airport, Sacramento, Calif., was held April 12-13. The program of events arranged by officials of the Sacramento Chamber of Commerce included an aerial exhibition and contests in which civilian planes and planes of the Army Air Corps from Mather Field participated. Cash prizes were awarded the winners of the various events open to civilian contestants. The events were sanctioned by the National Aeronautic Association.

The program of events announced by A. S. Dudley, secretary-manager of the Chamber of Commerce, included formation flights over Sacramento performed by civilian and Army planes; and acrobatics executed by planes of the Air Corps. The dedicatory ceremonies included a flight in three trimotor planes by representatives of the Government, civic and aeronautical organizations, which officially opened the airport; and races, maneuvers, bombing and acrobatics by planes of the Air Corps, cups being awarded to the winners of the races.

The events open to civilian planes in which cash prizes were awarded included the following: Dead stick landing contest; race to an altitude of 4,000 feet; slow race; a speed race for planes powered with OX-5 engines; speed race for ships with 225-horsepower power plants; and a free-for-all airplane speed race.

Emsco Company Constructs Long-Distance Plane for Mexican Goernment

THE Emsco Aircraft Company of Downey, Calif., has completed the construction of a high-wing monoplane for the Mexican government. The plane will be used by Lieut.-Col. Pablo L. Sidar of the Mexican air corps in a flight from Mexico City, Mexico, to Buenos Aires, scheduled to start May 10 sponsored by the Mexican government.

The plane has a gasoline capacity of 1,000 gallons. Five tanks located in the fuselage have a total capacity of 800 gallons and two tanks built in the center of the wing section have a total capacity of 200 gallons. The plane has a span of sixty feet, a chord of nine feet, a length overall of thirty-six feet, and a cruising radius of 5,800 miles. The ship is streamlined and equipped with flight instruments.

West Coast Air Transport Reduces Rates

THE passenger rates of West Coast Air Transport Corporation on the route from Seattle, Portland and San Francisco to Montague, California, have been reduced approximately thirteen per cent, according to an announcement of Homer J. Merchant, general traffic manager of the company. Passenger traffic over West Coast Air Transport's Seattle-Portland-San Francisco line increased one hundred per cent in March over the month of February, and there has been a steady increase in passenger volume since the first of the year.

Flying Club of Calif. Develops Airport

APPROXIMATELY $100,000 will be expended for the construction of buildings and landscaping of the Flying Club of California, according to a recent announcement of officials of the club. Excavation work for foundations, basements and swimming pool has been completed and the concrete has been poured. Construction is scheduled to be completed in July.

The club buildings will be located in Griffith Park on Victory Boulevard, Los Angeles, Calif., and the clubhouse will face the cross runway of the Grand Central Air Terminal. The club will own and operate private hangars for the use of aircraft owned by members.

The plans include the construction of a clubhouse containing a lobby, main lounge, ladies' lounge, men's card room, grill, dining and ball room, locker rooms, men and women's shower rooms, steam rooms, twenty-three living rooms, with baths, for the use of members and guests; swimming pool, handball courts, tennis courts, miniature golf course, and a barbecue pit.

The California Flying Club is a non-profit, social and service organization, according to officials of the club, and four classes of membership are available; life, charter, regular and non-resident, the latter for those living more than 200 miles distant from Los Angeles. Those interested in aeronautics are eligible for membership.

CONTACTS

[F. E. SAMUELS]

I RECENTLY completed a trip over the southern section of California, visiting numerous flying fields and manufacturing plants, and I was greatly impressed with the many improvements that have been made at the different airports, and the healthy activity going on in the branches of the aviation industry. My first stop was at the Los Angeles East Side Airport adjoining the city of Whittier, and located on a wide boulevard. New hangars and well graded runways make this airport valuable for the many private and commercial planes that make the field their headquarters for student instruction, pleasure and charter flights. A few miles further is the Fullerton Municipal Airport, three miles southwest of the city of Fullerton, where William Dowling and Willard Morris have built up a good business by careful and conservative flying.

PASSING through the orange grove country, I stopped at Santa Ana, and called on Mr. Kinslow, manufacturer of "Vitalite" pistons. Mr. Kinslow guided me through his great plant, showing me the many improvements being made. While at Santa Ana I also visited the Eddie Martin Airport, which Standard Airlines, T.A.T.-Maddux Airlines and Pickwick Latin-American Airlines all make a flag point of call. There is always plenty of activity at this airport.

ALL along the route from Santa Ana to San Diego, at intervals of every few miles, emergency flying fields have been installed by the different airlines flying over this territory. On the main highway at San Diego is the airport and shops of the T. C. Ryan Flying School. Standard Airlines, Western Air Express and T.A.T.-Maddux make this their San Diego terminal. T. Claude Ryan makes every visitor welcome to his plant and he reported business in student instruction at top notch, and passenger flying even better than it was a year ago.

FOLLOWING along the shore, I next came to the Lindbergh Field, San Diego's municipal airport and headquarters of the Airtech School of Aviation, where Doug Kelly officiates as manager of the flight training division. To say that this airport is a busy place is describing its activities mildly, for, during the two days I was in San Diego, I doubt if at any time there were less than 200 automobiles parked along the enclosure. While visiting at the airport, I had an opportunity of seeing Miss Sarah Brisbane, daughter of Arthur Brisbane, taking instruction in a primary glider. I also saw Frank Hawks take off on his San Diego-New York glider trip.

AT LINDBERGH FIELD is the plant of the Bowlus Sail Plane Company, situated in the building where the *Spirit of St. Louis* was designed and built, and which was for a number of years the headquarters of the Ryan and the Mahoney Aircraft companies. When I arrived at the factory the finishing touches were being put on the beautiful glider built for Lindbergh, before shipping it to the Detroit Air Show. Sam Breeder, formerly sales manager for the Ryan Aircraft Corporation and for the Lockheed Aircraft Corporation, is now sales manager for the Bowlus company. He and Mr. Bowlus made my visit to the plant a pleasant one, showing me the gliders under construction. A large force is working overtime in order to turn out the accumulated orders for the Bowlus Sailplane.

NEXT door is the plant of Solar Aircraft, builders of an all-metal cabin monoplane. The company has one finished plane which is proving very airworthy. It has unusually fine lines, is well constructed and has a roomy, comfortable cabin. As soon as the company receives the Department of Commerce approval, it will start building on a production basis. A short distance away is the Pacific Technical University building. A number of students were engaged in motor overhauling, and in wing and fuselage construction. The university works in conjunction with the T. C. Ryan Flying School,

(Continued on next page)

RUSSELL "Lobe"

Cotton Canopy

PARACHUTE

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Note These Outstanding Advantages

The Russell "Lobe" type *cotton canopy* Parachute resists mildew. . . . . It will not chafe. . . . . It resists cord burns—and lasts just as long as a silk parachute. The Russell *cotton* Parachute weighs only 2½ lbs. more than a parachute made of silk.

The Russell "*Lobe*" type of Parachute has only 1/3 the opening shock, or strain, of other types of parachutes.

The special cotton material used in Russell *cotton canopy* Parachutes is fully 2/3 as strong as silk. This means that the Russell *cotton* Parachute is more efficient, or has a greater FACTOR OF SAFETY, than other types of parachutes constructed of silk.

Exhaustive Tests Prove This

THE RUSSELL "LOBE" PARACHUTE with a *cotton* canopy is a safe parachute at a sensible price. The Russell "Lobe" Parachute with a *silk* canopy has many superiorities over other parachutes on the market—and costs no more than other types.

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(Contacts Continued)

ALMOST in the heart of San Diego is the building that houses the plant of the Russell Parachute Company. If the business being done by this company expands in proportion to what it has in the past two years, it will be but a short time before the organization will require the entire building, instead of the two floors that it now occupies. The Russell Parachute Company has recently opened a sales office at the Grand Central Air Terminal, Glendale.

MY NEXT VISIT was with Mr. H. A. Erickson, the aerial photographer, who has just completed in record time the Tia Juana-Agua Caliente survey of forty square miles of aerial mapping for the Mexican government. The entire flying and photographic work was completed in three days. A "Stearman" J-5 was used, piloted by Captain S. Boyer of the Mexican Air Service. Mr. Erickson has one of the best photographic plants in this country with a capacity of turning out 450 square miles of aerial mapping a day. Major Erickson completed the Salinas Valley Survey of 2,200 square miles, in seventy-six hours flying time; the job was finished complete in ten weeks.

ON MY RETURN to Los Angeles I visited the plant of the Zenith Aircraft Company. Mr. Price, president of the company has a large force employed, building the new six passenger and pilot biplanes, which are combination mail and passenger ships. As soon as the company receives the Department of Commerce approval of their new product, they will start production. A number of orders have already been taken, subject to Department approval.

I NEXT called on the Crawford Airplane and Motor Manufacturing Company, where the entire working force is working overtime turning out power gliders designed by Mr. F. Crawford. Mr. Crawford informed me that since he turned out his first glider a few months ago his organization has taught over one hundred students to fly them. He also claims that any one who knows a little about an engine and is a judge of speed can learn to fly one of these planes with less than two hours instruction. As I arrived at the plant, they had just returned from an unusual test—that of landing the glider on a moving motor boat. After a short stay on the boat, the plane took off from the deck of the boat and flew back to the flying field. The power glider is of the primary glider style and is built with a small motor in front of and just a little below the pilot seat.

CLARENCE SAILLAND recently opened an airplane laundry at the Los Angeles Metropolitan Airport. A pilot arriving at the airport, with his engine and plane dirty and greasy, can turn it over to the laundry, and, in the time necessary to do the work, the plane leaves the laundry with its engine clean, the wings and fuselage washed and polished, the upholstery in the cabin or cockpit cleaned and patched if necessary, all bolts tightened, and the landing gear and brakes adjusted when necessary. Planes wait their turn for service at this airplane laundry.

A COURSE of instruction for the purpose of training transport pilots to become competent flying instructors has been added to the curriculum of the Standard Flying Schools. The course includes fifteen hours of flight instruction in all maneuvers, signals and present day methods of instruction, as well as a thorough study of all maneuvers, reasons for them, and the ways of correcting faults. Prerequisites for those eligible for this instructor's training are 250 hours of solo time and a government transport license. This course was designed primarily to help qualify those applying for the instructor's license issued by the Department of Commerce and to help meet the need for competent flying instructors.

THE new Bendix Building at Twelfth Street and Maple Avenue, Los Angeles, constructed by the Bendix Aviation Corporation, has been opened by the company. The company invested approximately $1,000,000 in the acquisition of the site and the construction of the building, which will contain headquarters where the western activities of the Bendix company will be directed. Space in the building will be rented to other companies.

A fifty-million candlepower airway beacon is installed on the top of a tower erected on the roof. An assembly hall with kitchen facilities is located on the second floor and will be used for conventions and exhibitions held by tenants. The ground floor contains a bank, telegraph office, barber, restaurant and shops. A garage accommodating ninety automobiles is located in the basement and is equipped with a floor ventilation system. The Aeronautics Branch of the U. S. Department of Commerce has established headquarters in the building.

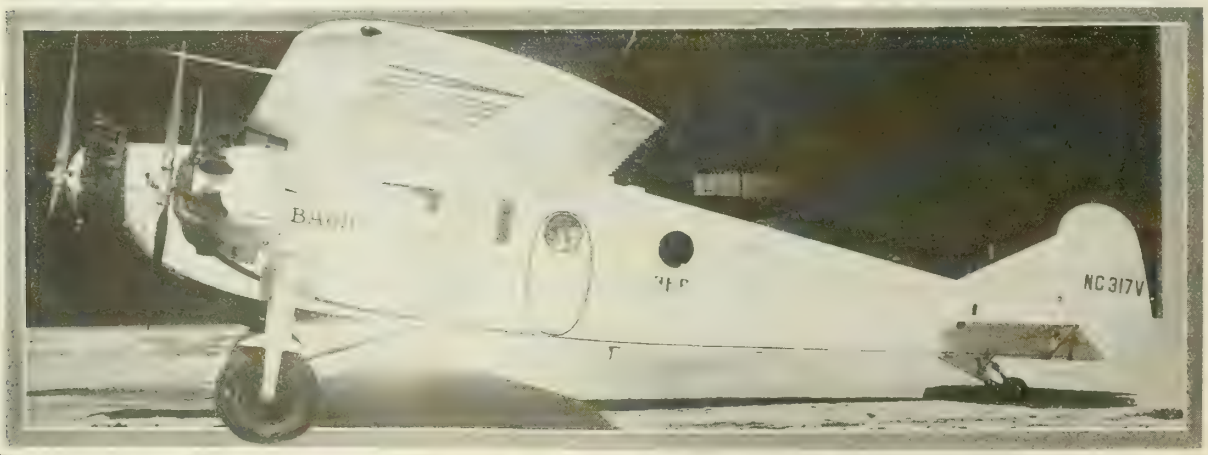
CALIFORNIA

COMPLETION of a contract between the Axelson Aircraft Engine Company of Los Angeles and the Swallow Airplane Company of Wichita, Kansas, providing for the exclusive use of Axelson Type B engines in all Swallow three-place training biplanes and two -place short biplanes, has just been announced by J. C. Axelson, president of the Axelson organization. Due to standardization on the part of the Swallow Airplane Company and the increase in engine volume for Axelson, both concerns will accomplish economies in production by the agreement, Mr. Axelson stated. Although no definite schedules have been set for production the new arrangement may double the present output of Axelson engines.

AN order from the United States Army Air Corps for fifteen Kinner-powered Fleet training planes, fourteen spare Kinner engines, and spare parts for plants, engines and engine tools, has been received by the Fleet Aircraft Corporation of Buffalo, N. Y. The engines which will power the ships are made by the Kinner Airplane and Motor Corporation of Glendale, Calif.

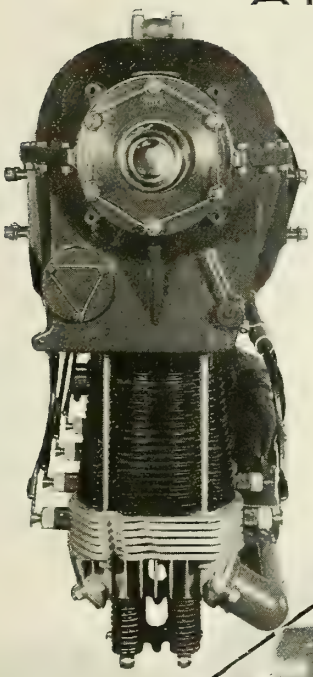
The Navy Department, which recently

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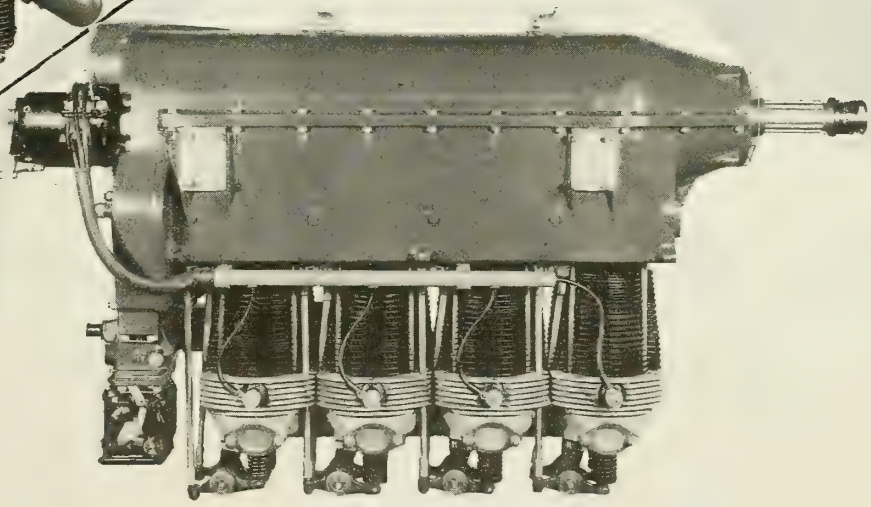


The trimotor Bach which recently broke world's record for planes carrying a payload of 2,000 kilograms over a 100 kilometer course

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Say you saw it in AERO DIGEST

(California News continued)

completed tests of this equipment, has placed an order with the Fleet company for six Kinner-powered Fleet plants, spare engines and tools. In addition to the above, the Kinner company has received an order direct from the Navy for six engines and a large number of spare parts.

H. V. Allen, formerly with the General Motors Research Laboratories at Detroit, Mich., has been appointed research engineer for the Kinner Airplane and Motor Corporation plant at Glendale, Calif.

A CROSS-COUNTRY flight of 1,000 miles from San Diego to San Francisco, Calif., was recently completed by transport students of the Ryan Flying School of San Diego, Calif. The flight was made under the direction of S. E. Robbins, chief flight instructor of the school, and Great Lakes planes were used. Stops were made en route at Los Angeles, Taft, Calinga, San Jose, Oakland and Tulare.

COURSES in glider flying as preparatory work for the handling of motored ships have been started at the Oakland Municipal Airport, Oakland, Calif., by the Boeing School of Aeronautics. The company has leased a 480-acre field in southern Alameda country where instruction in glider flying will be given. Gliders made by the Matteley Airplane and Motor Company of San Bruno, Calif., will be used for instruction.

THE current assets of the Kinner Airplane and Motor Corporation of Glendale, Calif, totaled $825,000 on March 1, according to a recent announcement of officials of the Kinner company. Current liabilities totaled $79,000 and cash on hand amounted to $160,000. On March 1 there were in transit on c.o.d. orders aircraft products of the Kinner company with an approximate value of $60,000.

EIGHTEEN Hamilton top-side intakes have been ordered from the Aero Corporation of California by the Fokker Aircraft Corporation, according to a recent announcement of officials of the Aero corporation. The intakes will be installed as standard equipment on the Fokker F-32 transport planes which the Fokker company is constructing for Western Air Express.

UNITED AIRPORT, Los Angeles, Calif., which was designated for the Southern California demonstration of the Army Air Corps on April 26-27, was designed as an A1A airport by Boeing Air Transport, which developed the field. United Airport contains facalities for manufacturing and servicing airplanes, show rooms and a display hangar, and is a six-directional field with macadamized runways 300 feet wide and 3,500 feet in length. Construction of a four-story administration building with 20,000 square feet of floor space and the installation of a lighting system were recently completed at the field.

APPROVED Type Certificate No. 308 was recently awarded to the Lockheed Aircraft Corporation for the metal type model of the Lockheed Vega by the Department of Commerce. The Lockheed company is a subsidiary of the Detroit Aircraft Corporation of Detroit, Mich.

VARNEY AIR LINES of San Francisco, Calif., was erroneously reported to be a division of the Keys-Hoyt group of aircraft companies in an article "Grouping of Aircraft Companies" by Ralph L. Woods, which appeared in the March issue of AERO DIGEST. The Aviation Corporation of California owns a minority interest in the stock of the Varney company, and several of the directors of the Varney company are directors or officers in companies in the Keys-Hoyt group. However, the majority of the stock of Varney Air Lines is controlled by Walter T. Varney, who founded the company.

MENASCO MOTORS, INC., of Los Angeles, has started production of the four-cylinder in-line inverted "Pirate" engine, according to a recent announcement of A. S. Menasco, president of the company. R. Ernest Tucker, former sales and service manager of the Kinner Airplane and Motor Corporation, has been appointed sales manager of the Menasco company.

New York headquarters were opened in May under the supervision of Milton Menasco, eastern representative of the firm. Equipment in use at the factory will permit a production schedule of from twenty to sixty engines per month.

IMMEDIATELY following relocation of certain sites for intermediate landing fields on the Los Angeles-San Diego airway, L. C. Elliott of the Airways Division, Department of Commerce, will begin the survey of the San Diego-El Paso airway, according to an announcement made recently by the department of Commerce. This survey will be to determine sites for intermediate landing fields and airway beacons. Completion of the survey is expected before 1931, although it was not determined whether beacons would be erected by that time.

THE Curtiss-Wright Flying Service has started the operation of three planes in crop-dusting work in the San Joaquin Valley, Calif., and will begin airplane crop-dusting operations in the Orange County district, according to a recent announcement of officials of the company.

Paul C. Jackson is supervisor of all crop-dusting activities for the Curtiss-Wright Flying Service, and Benjamin J. Busch is sales director of the Los Angeles base. The company has contracted with Western Sulphur Industries and the Agricultural Chemical Works to supply the materials used in dusting.

CAPT. E. L. CURTIS has been appointed chief engineer of the aviation service division of the Richfield Oil Company of California. He will organize a department which will act in an advisory capacity to communities and aviation organizations desiring advice relative to selection of airport sites and methods of surfacing airports, and which will furnish specifications, plans and cost data for the construction and operation of airports. Capt. Curtis was formerly airways extension superintendent of the Airways Division of the Department of Commerce.

OAKLAND

[H. V. WALDORF]

WITH the acquisition of the Northern California and Pacific Northwest distributorship of Bowlus sailplanes, the Varney Air Service, Inc., whose base is at Oakland Municipal Airport, has opened a series of glider training schools throughout its territory. The first gliderport has been established on top of Mission Peak, eighteen miles from the Oakland Airport. The summit is about 3,000 feet above sea level.

Franklin Rose, who was recently promoted to vice president of the company, is directing the glider program. The company has also added the Kitty Hawk and Viking lines of aircraft to its sales in this territory.

SERVICE between San Francisco and Vallejo, Calif., has been inaugurated by Air Ferries, Ltd. The distance is about thirty miles. The flying time for the trip, which is made every half hour, is fifteen minutes. The new service, which operates from the San Francisco terminal of the company's Oakland-San Francisco service, was started following the delivery of a fourth Leoning amphibion plane.

Service to Stockton, Sacramento, Sausalito, Richmond and other northern California cities is planned for early inauguration.

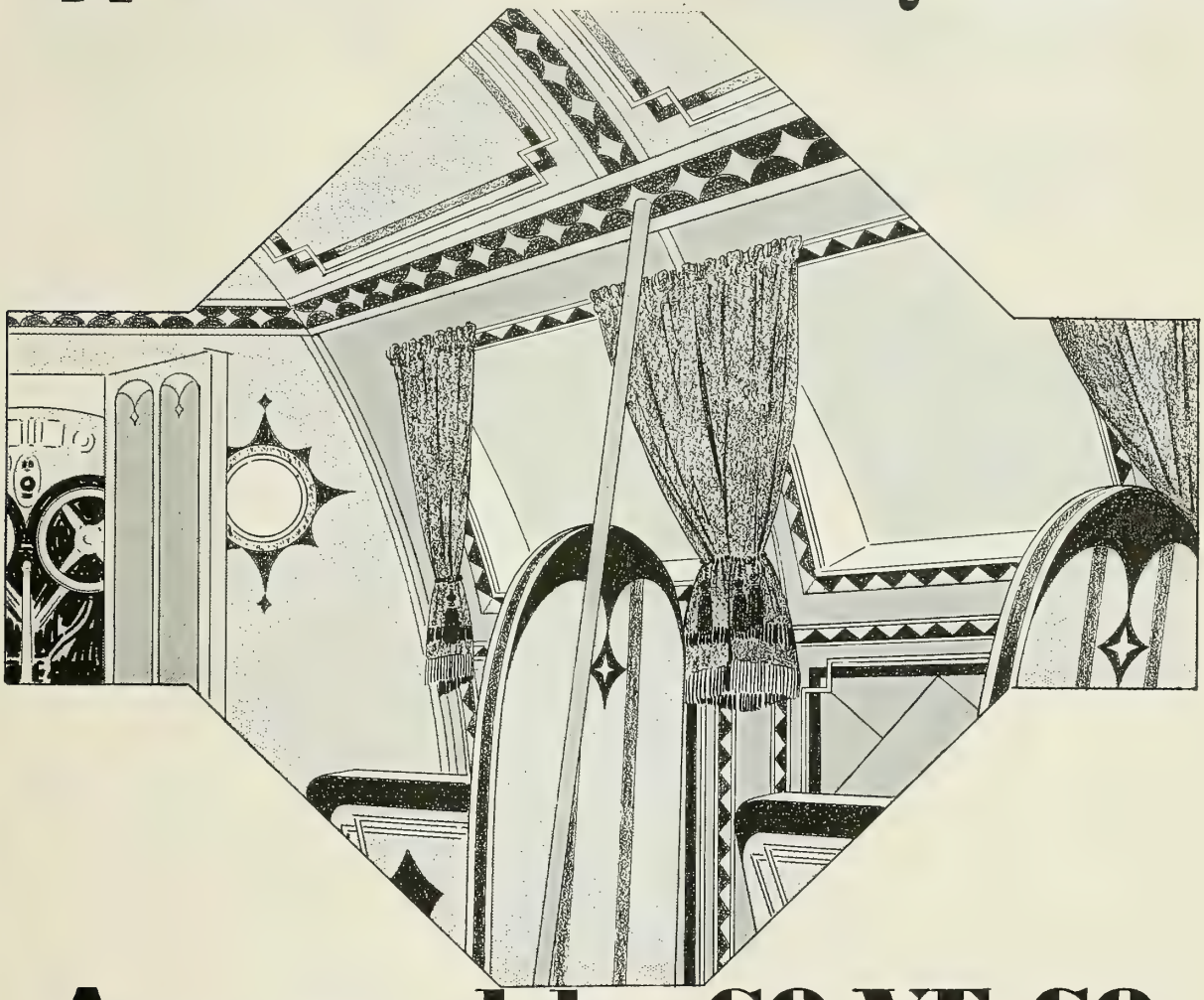
FIRST of the company's transcontinental chain to be completed, the Boeing Air Transport radio station at Oakland Municipal Airport has been placed in operation. The station went on the air shortly after the company's first radio equipped mail plane was placed in service. The company is establishing fourteen radio stations on the Oakland-Chicago route.

PERMISSION to erect a radio range beacon on Oakland Municipal Airport has been granted to the Airways Division of the Department of Commerce by the board of port commissioners. The beacon is to be remotely controlled from the Oakland airway radio station, about three miles distant.

Three guiding waves will be sent out from the radio range beacon, one to the south, one north and one along the transcontinental route. A site at the western boundary of the Oakland field has been

(Continued on next page)

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Co-Ve-Co Port Orford Cedar is extremely light in weight and evenly grained. One of it's outstanding qualities is the ease with which it can be worked, requiring comparatively little sanding, if any, to bring it to a suitable finish. It does not splinter or pit while being put through a planer.

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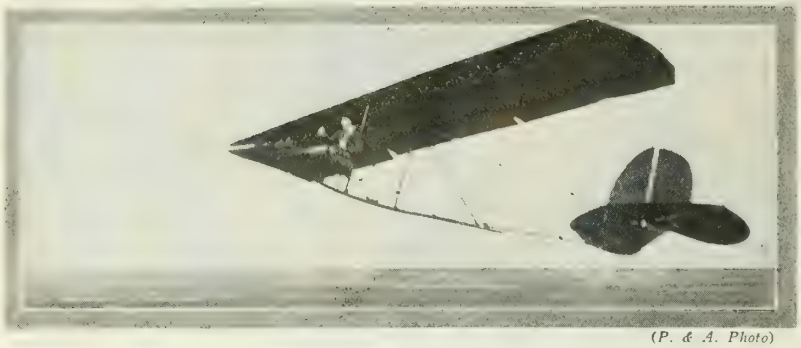
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(*P. & A. Photo*)

Betty Leekley, twelve years old, taking off in a primary glider at Riviera Field, Hollywood, Calif.

(*California News continued*)

selected by Norman Bliss, who is directing the installation of the beacons on the Pacific Coast.

A TOTAL of 425 students are taking flying instruction at the various flying schools being operated at Oakland Municipal Airport. During the month of March student landings at the field totaled 4,362. The total number of landings for the month was 6,766. Passengers carried amounted to 3,160.

THE National Air Pilots Association recently formed an active chapter at Oakland Municipal Airport. The chapter, which limits membership to Class A members of the association, is known as the Golden Gate Chapter. Organization of the unit was directed by Harry Huking, president of the national organization. Work is to be started on similar chapters at other leading air centers of the nation.

Problems of aviation will be discussed at the meetings of these chapters and studies of new safety devices are to be sponsored according to present plants. Art Starbuck, ranking pilot of the Pacific Air Transport coast service, is chairman of the Oakland chapter. Ernie Smith and Raymond "Chi" Parshall are directors. Meetings are to be held very two weeks.

TO house the thirty-two passenger planes added to the flying equipment of its coastwise service, Western Air Express has applied to the board of port commissioners for additional hangar space at Oakland Municipal Airport. The present lease calls for half of Hangar No. 1, about 8,000 square feet of space.

ALAMEDA

[H. V. WALDORF]

CONSTRUCTION of a hangar to measure 150 by 400 feet has been started at the San Francisco Bay Airdrome, located on the western water front of Alameda. The hangar is to cost about $100,000.

The work was started following the completion of leveling the field and paving the runways. R. U. St. Johns, formerly chairman of the Sacramento airport committee, has succeeded Lynn Schloss as general manager of the flying field. The field is to be opened for operation this summer.

AN unofficial speed of 206 miles per hour was attained by Capt. John A. MacReady in March during test flights of his Lockheed Sirius over a mile course at Alameda Airport. The average for six dashes over the course, with and against the wind, was 198 miles per hour. Sixty gallons of gasoline were carried.

LOS ANGELES

A COURSE of instruction for the training of transport pilots desiring to become flying instructors has been added to the curriculum of the Standard Flying Schools of Los Angeles, Calif. The course includes fifteen hours of flying instruction in maneuvers, signals used in teaching student pilots, correcting the faults of student pilots, and reviews present day methods of flying instruction. A Government transport pilot's license and 250 hours of solo are prerequisite for those eligible for this course.

A REPORT of the activities of the Los Angeles Airport, Los Angeles, Calif., during March was issued recently by Woodruff De Silva, assistant director of airports for Los Angeles. There were thirty clear days and one foggy day during this period. A total of 614 passengers were carried at the field, and 767 students were flown. Planes visiting the field totaled 215 and 620 landings were made by these ships. Planes housed at the field made 5,098 landings, and 214 landings were made by gliders which were launched by the towing method.

CONSTRUCTION has been started by the Emsco Aircraft Corporation of Downey, Calif., of a thirty-five place transport plane powered with four Pratt and Whitney Wasp engines. The plane will have a wing span of 112 feet, a length of 78 feet and will be twenty feet in height. The wing will be all-metal, and chrome-molybdenum steel tubing will be used throughout in the construction of the fuselage and tail surfaces.

A COURSE in aerial photography has been inaugurated by Crescent Airways of Los Angeles, Calif., in coöperation with Southwest Photo Service. Harry O. Steiger, manager of the Southwest company, has been appointed chief aerial instructor of the Crescent aerial photography school.

The course of instruction includes five hours of instruction in the air and laboratory and dark room work, the student developing and printing his own photographs.

CANAL ZONE

[J. F. H.]

SINCE March 10, Costa Rican mail has been carried to the United States and Central and South America by planes of the Pan American Airways, and passengers are being carried over part of the route. San Jose, capital of the little republic, is at an altitude of 5,000 feet and off the path of the airline. The point of connection for the city is at Puntarenas, Pacific coast seaport, where mails and passengers are transferred. Passengers make connections by taking a short train ride from the capital, and mail is flown in a shuttle plane to and from the capital. The mail shuttle service is made in less than two hours.

This service is proving particularly helpful to the Costa Ricans who are using it to transact business in the United States or other parts of Latin America. Business men find it convenient in getting to other parts of Central America instead of waiting for steamship connections.

RESPONDING to a steady demand from residents of the interior towns Pan American Airways contemplate extending feeder service through the republic of Panama on a tri-weekly schedule and connecting at David with the mail and passenger planes linking the Canal Zone and the United States. Boquette, center of the rich Vulcan coffee section, Chiriqui, headquarters of the United Fruit company, Almirante, and other centers of population at widely separated points from the capital, will probably be linked together by the service.

These centers are separated by almost impassable jungle trails requiring days of travel on mules to go from town to town. Small coastwise steamers with uncertain schedules are sometimes the only method of reaching Panama City. The David-Panama City service has proved exceptionally popular and business men as well as tourists are anxious to travel by air.

PANAMA officials have signed a contract with the Scadta line of Colombia to carry all Panama air mail to Colombian and Ecuadorian points. This will give residents of Panama additional opportunity to get rapid service on all letters and parcels addressed to South American cities.

Under the terms of the contract mail sent by Scadta planes will reach both coasts of Colombia within thirty-six hours and Ecuador within two days. Scadta, German-Colombian owned, has been operating its air service to the Canal Zone for the past year

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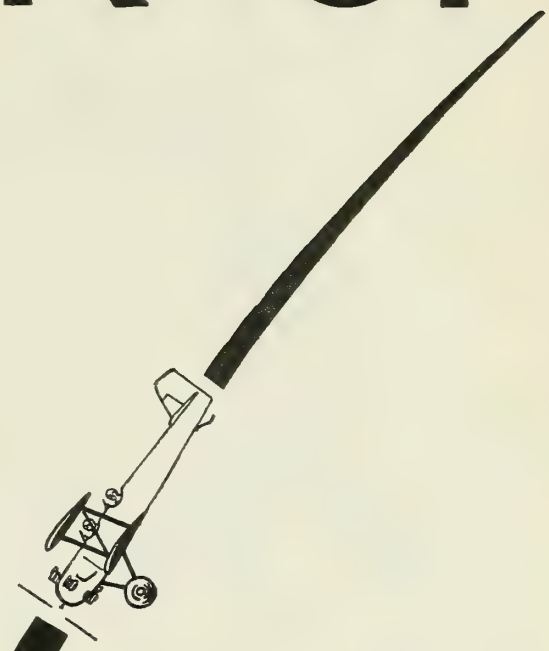
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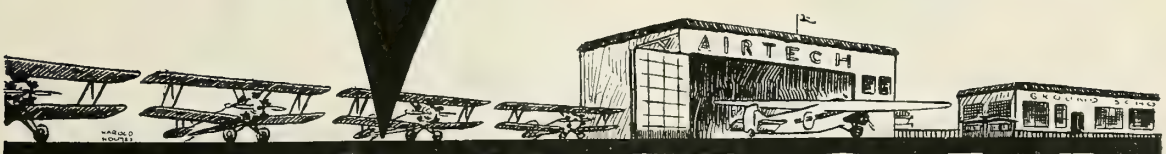
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AIRTECH

LINDBERGH FIELD SAN DIEGO

(Canal Zone News continued)

and planes leave bi-weekly enroute to South America carrying mail, passengers and freight.

ARIZONA

[H. G. WILSON]

WITH approximately 250 airplane visitors during March, a new high record for air travel was recorded for the two Tucson, Ariz., airports. Ninety-eight Government planes and eighty-five commercial planes, including the regular passenger planes of Standard Airlines and Scenic Airways, landed at the Municipal Airport during the period. Many other planes landed at Mayse Airport. The major reason for the heavy influx of planes was the air maneuvers in California, the Second Bombardment Group and twenty-nine planes of the Attack Group, Fort Crockett, Texas, refueling in Tucson. These planes and others were expected to stop on their way to home fields.

THE municipal airport at Douglas, Ariz., has been declared a port of entry, making three such ports along the international boundary of Arizona and Mexico. The first to be so designated was Nogales, and the second, Ajo. The Douglas field is the only one in the world where an international border serves as a boundary line between two national airports. The American side of the international airport at Douglas is well developed and has a complete lighting system. A number of improvements are planned for the Mexican field at Agua Prieta. G. N. Williams is now superintendent of the Douglas airport.

WORK of improving the Tucson municipal airport is progressing rapidly. An administration building is being constructed and material additions are being made to the lighting system. Seven additional floodlights, a revolving beacon light, projector light, illuminated air cone and obstruction lights are being added. The field was the first in the state to be lighted for night flying.

THERE were forty automobile fatalities in Arizona during the first three months of 1930, and but thirty plane fatalities in the last five years, according to figures compiled by the *Arizona Republican* at Phoenix. During the first three months of the year there were no plane fatalities and no major accident to any plane, with more planes flying than ever before in the history of the state.

THE United States Aerial Express Lines, Inc., filed articles of incorporation in Arizona, March 10, as an initial step toward organizing a nation-wide airplane freight service. The company is sponsored by Aircraft Finance Corporation of America. Two other companies are contemplated. one to build Diesel engines for planes and another for aviation research and development. Headquarters for the proposed company will be in Los Angeles.

AJO AIRPORT, recently declared an official port of entry, was dedicated April 12 with officials from two countries and planes from many parts of the Southwest in attendance. The field is on a direct east-west line across the southern part of the country and is used considerably by fishing parties from Arizona going to the Gulf of California, which is less than two hours flying time from Phoenix and Tucson.

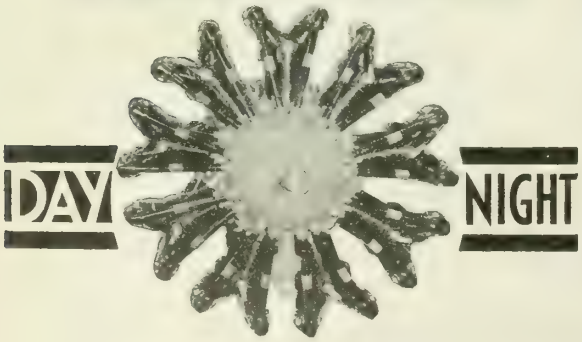
COLORADO

ITS membership increased to seventeen by a recent appointment of twelve additional patrolmen and detectives by Police Chief R. F. Reed, Denver's new air police squadron went into actual training during the past month. The new air squadron will be the first of its kind in the western part of the country, and is expected to increase the efficiency of the department. Five of the men named for the squadron are experienced pilots. The air patrolmen will be given regular weekly instruction, being relieved from other duties during the school periods.

MRS. ANTHONY F. JOSEPH, Denver woman pilot, was chosen presi-

(Continued on next page)

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COMPARE the flying equipment. RYAN students train on Great Lakes and Fleet planes. RYAN transport students fly 20 hours in Ryan Broughams.

COMPARE the weather conditions. RYAN students enjoy an average of 356 flying days yearly, under San Diego's perennial blue skies—where winters are warm, summers cool!

COMPARE the aviation contacts open to students. San Diego is the scene of the world's greatest year 'round flying activity; military, commercial and private. RYAN students often witness massed flights of 100 to 250 planes.

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°These courses include 400 hours of Ground School with Lectures, Laboratory and Shop Practice
†The Private Pilot's Course includes 200 hours of Ground Training.

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Say you saw it in AERO DIGEST

(Colorado News continued)

dent of the Women's Aeronautical Association of Denver during April. The permanent organization meeting was held at Lowry field. Other officers are Mrs. J. E. Murray and Mrs. W. Octave Chanute, vice presidents; Mrs. R. A. Geggs, secretary, and Mrs. William Buckland, Mrs. Bruce Kistler, Mrs. J. P. Wright, Mrs. Ralph J. Hall and Mrs. Neil T. McMillan, assisting officers. Directors are Miss Helen Bonfils, Mrs. Edward Roberts Murphy, Mrs. David Stewart, Mrs. Gertrude Hopkins and Mrs. Harold J. Cordner.

OUTSTANDING among civic achievements in Fort Collins, Colo., during 1929 was the acquiring and equipping of a 200-acre aviation field, the use of which is free to pilots. Located two miles from the business center of the city, the field is held under a five-year lease from the Colorado Agriculture College. Due to the proximity of the mountains, it was deemed advisable to have a short-term lease during the period of which a study of air currents and other climatic factors could be made to determine the advisability of a permanent field at that location.

URGING that Brush, Colo., be made a stop on the direct airline from Denver to Chicago, a group of civic leaders of that town recently conferred with Capt. Ralph J. Hall, chairman of the state aeronautical committee of the American Legion, and Capt. Hall inspected the town's proposed aviation field sites. Funds for the construction of a new air field have already been raised, and its location will depend upon the selection of Captain Hall, who has been authorized to choose one of the sites.

UTAH

[G. PERRINS]

WORK of installing lights at Airport Ogden, Ogden, Utah, has commenced with all equipment to light the port on hand. New improvements are planned with more air mail in prospect. The airport area may be reduced by seventeen acres to cut the city's payments on the contract by $1,700.

SALT LAKE CITY aviation activities are increasing with the warm weather. To aid aviators in judging wind direction while landing, Commissioner Harry L. Finch announces that a twenty-five-foot illuminated arrow attached to a wind vane has been installed. The vane was designed by Charles J. Reading.

ALLEGING that the state gasoline tax on airplane fuel is unconstitutional, the Boeing Air Transport company has filed suit at Salt Lake City to recover $2,039 from the treasurer of the State. The action marks the second suit to be filed against state officials by an air transport company, the National Parks Airways, Inc., having filed suit several months ago. The latter is suing for the return of $496 paid under protest for gasoline tax.

WASHINGTON

[C. M. LITTELJOHN]

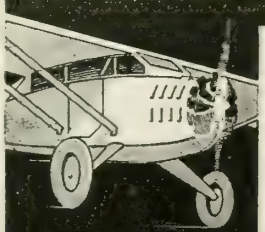
BOEING AIRPLANE COMPANY will in May test fly an all-metal low-wing Hornet-powered monoplane designed to carry a payload of 2,000 pounds and cruise approximately 145 m.p.h. Later a second model will be flown carrying cargo and passengers. The model is radically different, in many features of design, than previous planes built by Boeing for the commercial market. The plane will be marketed completely equipped—wired, bonded and shielded—for radio.

DATA on the longevity of planes in daily scheduled operations is contained in a recent operations report of Boeing System. Of twenty-four Boeing planes put into service July 1, 1927, nineteen are still in operation on the San Francisco-Chicago route. One ship, with 3,000 hours service is the veteran of the fleet and there are five others with better than 2,500 hours of service. All Boeing System planes are powered with 525-horsepower Hornet engines.

THERE are 162 men employed at the Boeing Aircrait of Canada factory at Vancouver, B. C. The plant, in addition to

(Continued on next page)

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A COMPLETE LINE OF AIRCRAFT FOR LAND AND SEA



THE EMSCO CIRRUS—*A two-place, sport and training, mid-wing monoplane, powered with a 95 h.p., four-cylinder, air-cooled American Cirrus motor.*



THE EMSCO B-3—*A single motored, eight-place, cabin monoplane transport that may be powered with a Wright 300, a Pratt & Whitney Wasp or Hornet engine.*



THE EMSCO CHALLENGER—*A tri-motored, eight-place, cabin monoplane, built to the same specifications as the B-3, except that it is powered with three Curtiss Challenger engines of 170 h.p. each.*

EACH A LEADER IN ITS CLASS

Engineered on sound principles that have been proven by years of experience in commercial and military aeronautics.... Built by master craftsmen in a new $1,000,000 factory equipped with the most modern approved production methods....These three types of Emsco Aircraft are proving every day their superiority in providing safe air transportation with greatest economy.

The Emsco Cirrus has flown cross-country under normal flying conditions with a fuel consumption of only 4.8 gallons per hour at cruising speed. Twice the 3-B, powered with a 300 h.p. Wright Whirlwind has taken off a gross load of approximately 10,000 pounds with a run of a half mile. The Emsco Challenger has demonstrated its dependability, safety and economy by flying more than 25,000 miles under all conditions, within the last four months.

In addition to these, the Emsco Aircraft Corporation has under construction at this time four new and distinctive types of planes, which, when completed and added to the present group, will make the Emsco line one of the finest and most complete in the industry today. These four include:

(1) a four motored plane carrying thirty-two passengers, two pilots and radio man; four Wasp motors—tandem; designed for all weather conditions and altitude flying, also offering economical transportation.

(2) The Emsco Amphibian—a bi-motored eight place, streamline; metal designed; built for heavy duty transportation.

(3) The Emsco Mail—a single motored monoplane; built for mail, express and freight; fast performance with a pay load of 1200 pounds.

(4) A special long range monoplane—extremely streamlined; designed for record distance flight.

All Emsco land planes are delivered from the factory with pontoon fittings so that no structural changes are necessary to quickly adapt them to seaplane work. The B-3 may easily be transformed into a tri-motored plane as fittings for outboard motors are standard. Structurally the planes are identical.

Complete specifications, performance data and prices will be forwarded on request.

EMSCO AIRCRAFT CORPORATION ✦ DOWNEY ✦ LOS ANGELES COUNTY ✦ CALIF.

Say you saw it in AERO DIGEST

(Washington News continued)

its production of work on the Boeing six-place Wasp-powered flying boats and Hornet-powered mail four-passenger cabin planes, has received a substantial amount of repair work on Canadian government and privately owned planes. It is the only airplane factory in western Canada.

CAPITALIZED at $25,000, Bigelow, Johnson, Inc., was recently formed and incorporated at Parkwater, Wash. The firm is to engage in business as airplane manufacturers.

THE Central Washington Airways Company was recently formed at Wenatchee, Wash., with Frank Kammer of that city named as president. Mr. Kammer has announced plans for a flying school for ground and flight instruction.

DOANHOE FIELD, including about 100 acres adjoining the city of Chehalis, Wash., will be converted into a new airport for the city of Chehalis by the Government. It is located mid-way between the two chief cities of the Northwest—Seattle and Portland.

PLANS are going forward for the rapid development of the new Tacoma, Wash., municipal airport, which was officially opened in March. Satisfactory operation and revenues have been reported since then, and it is now planned to develop the field into a recreational center for holding contests and competitions on the ground as well as in the air. One of the innovations at this field is the use of a part of the field as a primary school for aviation instruction of Tacoma high school pupils. The students work on old motors and old planes, and are at present busy building gliders.

MEMBERS of the recently formed Seattle Aviation Country Club who have not had previous flying instruction are now receiving flight training. Instruction was started at Bryn Mawr on April 10th. The club has thirty-five members. The training ship is a Fleet seaplane, a two-place biplane arranged for dual control. Thomas D. Stimson is president of the club.

VERN BOOKWALTER has just purchased the Inland Eaglerock airplane hangar on Felts Field, Spokane, and will make additions to the hangar, with offices, shops and workrooms. He will establish a complete overhaul depot for aircraft and engines in the structure.

SEATTLE'S first "Air Week," a city-wide celebration, was held April 21st to 28th, to sponsor an interest in aviation in the city. C. G. Frame, of the Washington-Alaska Airways of Seattle, was chairman of a special committee which held the celebration over the city and at Boeing Field. This committee coöperated in staging the events with local commercial aviation companies, flying field officials, representatives of national aeronautical aviation companies, Army and Navy fliers, and oil companies interested in aviation development.

IDAHO

[G. PERRIN]

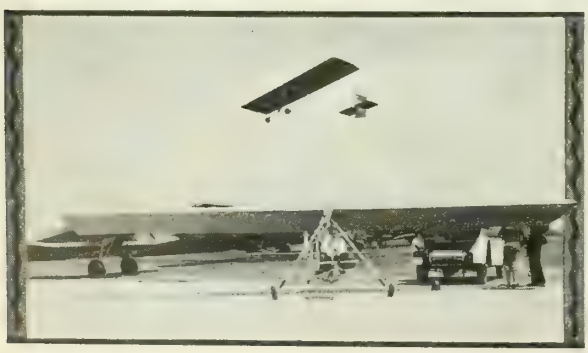
GROUND LIGHTS have been installed at the Burley, Idaho, airport, which is now fully illuminated for night flying. White lights on low standards have been placed about 300 feet apart in a conduit along one runway, about 4,200 feet in length. Green lights are set at both ends of the runway. A conduit has also been excavated along the border of the second runway and the electric cable laid.

The Burley field is the third airport field to be illuminated in Cassia county, border lights having been already installed at Idahome and Strevell.

MONTANA

THE city council of Bozeman, Montana, has under consideration five possible sites for an airport. The selections were made with the help and direction of A. H. Wait, airport specialist of the United States Department of Commerce. After the approximate cost of building an airport upon the selected site has been determined an attempt will be made, according to city manager G. P. Arnold, to float a bond issue to finance the work.

An effort is being made to have one of the proposed northwest air mail routes pass through Bozeman.



THE PELICAN GLIDER

$265.00, Ready to Fly, F.O.B. Venice
With landing wheels, $300
Crating for shipment extra

Or Build Your Own Glider

Blue prints and specifications, $7.50

EVERYTHING for the glider. Turnbuckles, 15c; cloth, 30c yd.; dope, $1 per gal.; wire, 40c lb.; govt. spec. caseined 1/32, 1/16, 1/8 plywood, 32c sq. ft.; aircraft bolts, pulleys, control cable, safety belts, etc., at comparatively low prices.

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IF IT FLIES—WE HAVE IT

50 complete Libertys, $100 to $200. 35 Hisso A's, $150 to $250. 2 new 9 cylinder Siemens-Halske motors, 125 h.p., $875. 10 new A 7A, 4 cylinder Hall Scott motors, $175. 15 OX5's, $200 to $350. OX6's, $375. Anzani 80 h.p., $400. New 3-cyl. Szekely with Hamilton propeller, $450. One new C-6 and 3 K-6 motors at a bargain. B. M. W., Mercedes, Renault, Hisso H, Le Rhone and all types of motors and parts at reduced prices.

Highest grade $7 helmets, $3.75. $5 helmets, $2. Protector goggles, $5.50. D. H. clincher or straight-side wheels, $8. Small turnbuckles, 15c. Cloth, 30c yard. Dope, $1 a gallon, container and shipping, 50c extra.

Champion, A. C., and various makes of spark plugs, 25c. Safety Belts, $2.25. 7, 8, 9, 10 and 12 cyl. Scintilla magnetos at half price. Govt. Spec. Plywood 1/32, 1/16, 1/8, 32c sq. ft.

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VENICE, CALIFORNIA

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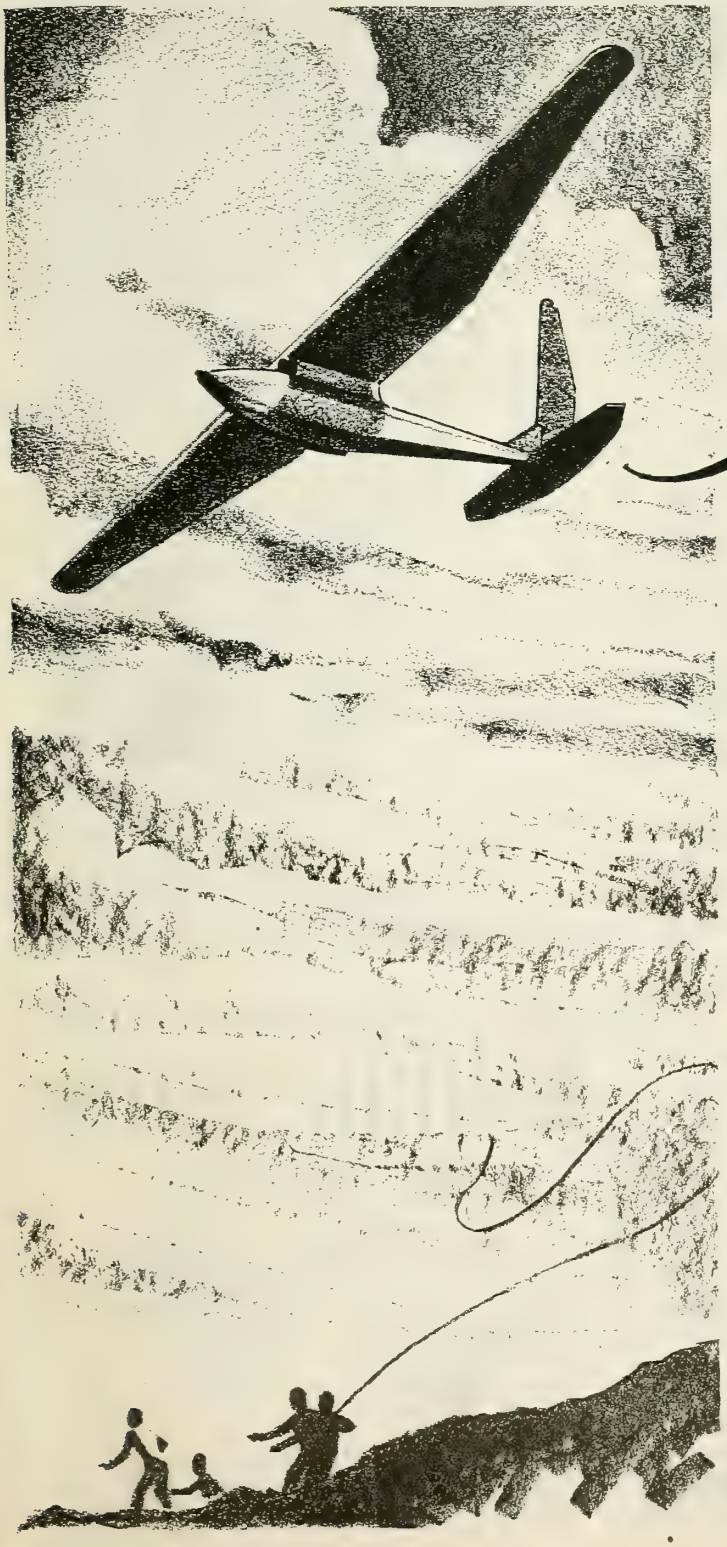
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meet the demand for trained flyers by training at a government approved school . . . new and modern equipment . . . thorough instruction for all classes of licenses!

CALIFORNIA AERIAL TRANSPORT

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SOARING PROFITS for SAILPLANE DEALERS Now



WIDE-AWAKE airplane dealers should be alive to the profit-producing opportunities offered by a Bowlus Sailplane Dealer Franchise, now offered for the first time!

Here is an unexcelled opportunity to add a highly profitable, easy selling sideline to your business with but a very small initial investment and at no increase of your present overhead!

The Bowlus Sailplane holds every official American gliding endurance record. It has made new American records only to break them. The front pages of America's leading newspapers have been printing stories on the Bowlus Sailplane for months. As a result, America is glider-conscious!

Private individuals are looking to gliding as the latest zestful sport. Gliding clubs are forming throughout the country. The Bowlus Sailplane and Bowlus Primary Glider are leaders in their field. Inquiries for purchase of both planes are pouring into the factory from all parts of the United States. The Bowlus Sailplane and Primary Glider have a very definite market, now capitalize it!

Communicate with the factory immediately for full and complete details of the Bowlus Dealer Franchise. The cream of the territory is available now. Act!

BOWLUS
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LINDBERGH FIELD • SAN DIEGO, CALIF.

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When you've landed in a short field and you're scratchin' your head, wondering if you can get out of it safely, just laugh it off; that is, if your OX5 motor is

MILLERIZED

Otherwise, stay where you are and write, wire or telegraph to us direct or to any of our Factory Representatives for the complete dope on how we modernize the OX so that it will compare with anything else on the market around the 100 horse power in reliability, economy and

Get-over-the-tree-tops-ability

This information will gladly be sent to you free of charge, together with the complete data as to the necessary parts and costs of our materials to complete the job.

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Universal Aviation Corp.
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Air Transport Equip., Inc.
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Upon finishing his course the Rankin System student is *qualified* for a better position in the world's most fascinating and promising industry.

There's a school near you where you can learn to fly the Rankin way. Upon request we'll be glad to send you complete details... entirely without obligation on your part. Clip the coupon and send it today.

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Tell me how to learn to fly the Rankin way in my vicinity.

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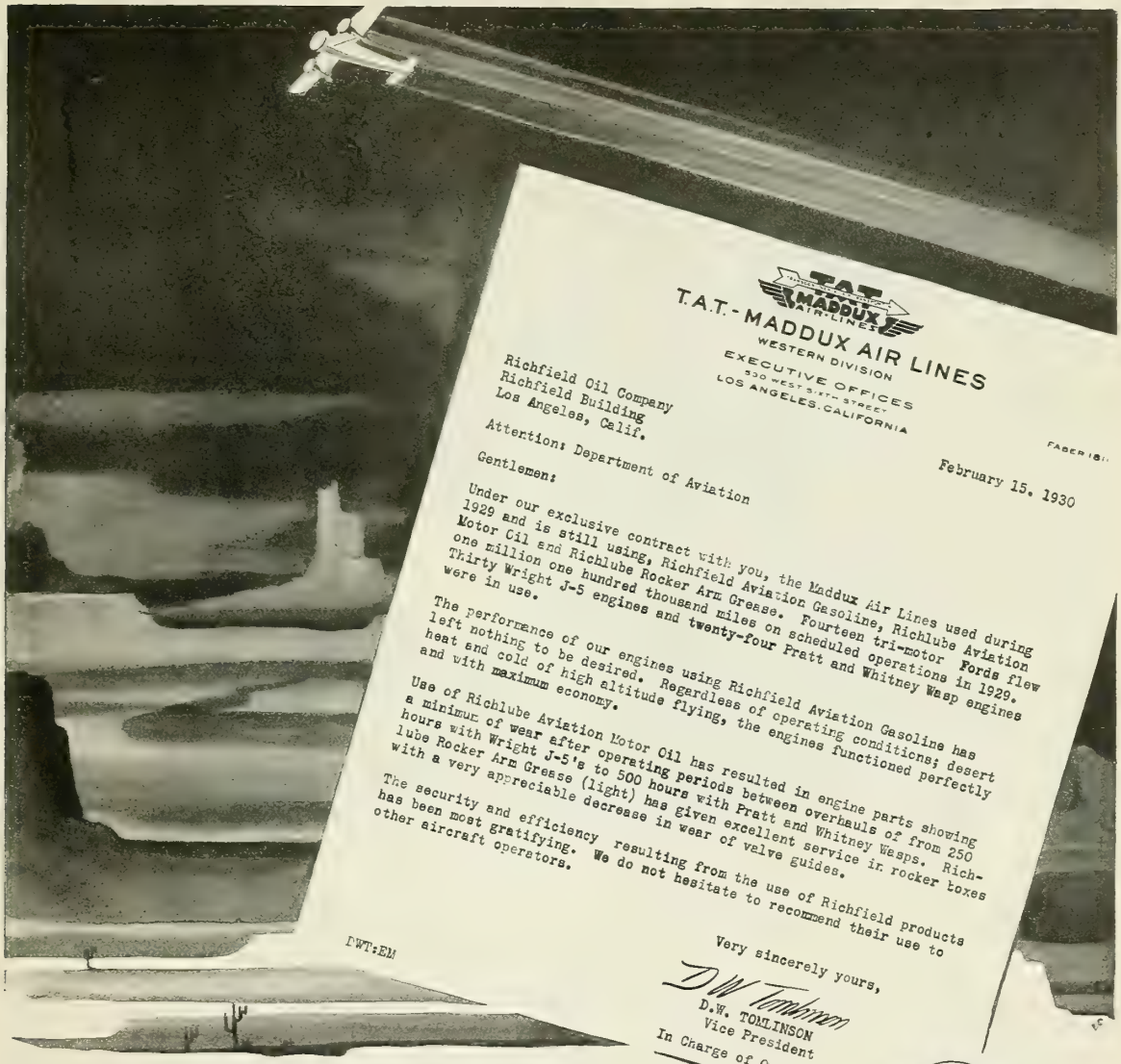
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A.D. 5-30



"A Million Miles of Satisfaction"

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A SWEEPING endorsement by one of the West's most famous air lines!

Maddux has used Richfield products exclusively for nearly two years and in that period of time has had ample opportunity to test the qualities of Richfield Gasoline, Richlube Motor Oil and Richlube Rocker Arm Grease. Their unqualified recommendation of all three products is the most convincing proof of quality that could be desired.

Western Air Express is another Richfield user. In fact, Richfield Gasoline is used exclusively by every major passenger transportation air line in the West — selected after exacting comparative tests!

Use this world-famous trio for your own flying equipment—Richfield Gasoline, Richlube Motor Oil and Richlube Rocker Arm Grease. Available at aviation centers throughout the United States.

RICHLUBE ROCKER ARM GREASE — 100% PURE PENNSYLVANIA OIL — RICHLUBE AVIATION MOTOR OIL

RICHFIELD

Say you saw it in AERO DIGEST

AERONAUTICAL INDUSTRY

LINDBERGH'S Coast-To-Coast FLIGHT

COL. CHARLES A. LINDBERGH established on April 21 a new transcontinental record of fourteen hours, forty-five minutes and 32 seconds in a flight of 2,530 miles from Glendale, Calif., to Roosevelt Field, L. I., a stop being made en route at Wichita, Kan., for refueling and to obtain weather reports. The actual flying time was fourteen hours, twenty-three minutes and twenty-seven seconds. He used a Lockheed Sirius monoplane and was accompanied by Mrs. Lindbergh.

The flight was undertaken for the purpose of testing the feasibility of using the higher altitudes in the development of a more rapid coast-to-coast, passenger, mail and express air transport service, and was made at an altitude averaging between 14,000 and 15,000 feet. The average speed of the flight was approximately 171 miles per hour.

The previous East-West transcontinental record of seventeen hours, forty-three minutes was established on a non-stop flight made by Frank M. Hawks in July, 1929.

Carrying 400 gallons of gasoline, Col. and Mrs. Lindbergh took off at Grand Central Airport, Glendale, Calif, at 5:26 a.m., Pacific Time (8:26 a. m., Eastern Standard Time) and covered the distance of 1,249 miles from Glendale to Wichita in six hours, fifty-six minutes and ten seconds. The average speed on this leg of the flight was approximately 181 miles per hour. After taking on 245 gallons of gasoline and fourteen gallons of oil, the plane took off for Roosevelt Field and landed at 11:11 p.m., Eastern Standard Time.

The Great Circle route was followed on the flight, Col. Linbergh plotting the course from Glendale north of Albuquerque, N. M., south of Denver, Colo., and north of St. Louis, Mo., and Columbus, Ohio. As the result of bad weather over Lake Erie, Col. Lindbergh deviated from the course, flying south of Cleveland and about 100 miles north of Pittsburg. On the last 300 miles of the flight he followed the air mail beacons toward Roosevelt Field. The flight was observed by officials of the National Aeronautic Association. Richfield aviation gasoline and Pennzoil oil were used.

The Lockheed Sirius plane which Col. Lindbergh used is a low-wing monoplane powered with a supercharged Pratt and Whitney Wasp engine. This ship is the first of a series of Lockheed planes known as the Sirius which the Lockheed Aircraft Corporation of Downey, Calif., manufactures on a commercial basis. The Sirius used by Col. Lindbergh has a 3,300-mile cruising radius. The normal cruising range of the Lockheed Sirius is 1,100 miles.

ELIMINATE SPIN TEST A. T. C. REQUIREMENT

BUILDERS of light aircraft seeking Approved Type Certificates will not be required to subject these craft to spin tests formerly required under an amendment to the Airworthiness Requirements of the Air Commerce Regulations announced recently by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

However, the Department of Commerce reserves the right to order a demonstration of spinning characteristics of light aircraft when in the opinion of the Department such a demonstration is warranted. Light aircraft, under the Airworthiness Requirements regulations, are defined as including airplanes in which the power loading is greater than 30 pounds per horsepower, and heavier-than-air craft without a power plant.

WATRES AIR MAIL BILL IS VOTED

THE Watres Bill authorizing revision of air mail routes and rates by the Postmaster General and amending the air mail act of February 21, 1925, so as to change the basis of air mail contracts let by the Government from a poundage to a mileage and space arrangement, was passed by the House on April 21. The bill provides that the new rates should be fixed rates per mile for definite weight spaces, these rates not to exceed $1.25 per mile. The bill has been placed on the calendar of the Senate.

The Postmaster General would be authorized to issue to contractors who have carried air mail satisfactorily for not less than two years, route certificates for not more than ten years from the time air mail service started on the route.

Under the present law the maximum rate is $3.00 per pound regardless of the distance the mail is to be carried. The Watres Bill would authorize the Postmaster General, in cases where the volume of air mail moving between two designated points does not exceed twenty-five cubic feet or 225 pounds, to award to the lowest responsible bidder who has operated and owned an air transportation service on a fixed daily schedule over a distance of not less than 400 miles and for a period of not less than six months prior to the advertisement for bids, a contract at a rate not to exceed forty cents per mile for a weight space of twenty-five cubic feet or 225 pounds.

CONDUCT CENSUS OF AIRCRAFT INDUSTRY

A CENSUS of manufacturers in the United States, including producers of aircraft, aircraft parts and aeronautical accessories, has been started by the Bureau of the Census of the Department of Commerce. A preliminary report containing statistics of various industries, including aviation, will be issued following the receipt of approximate returns. The report on the aeronautical industry will show the number and value of aircraft manufactured in 1929 and the increase or the decrease in the total products of the industry as compared with 1927.

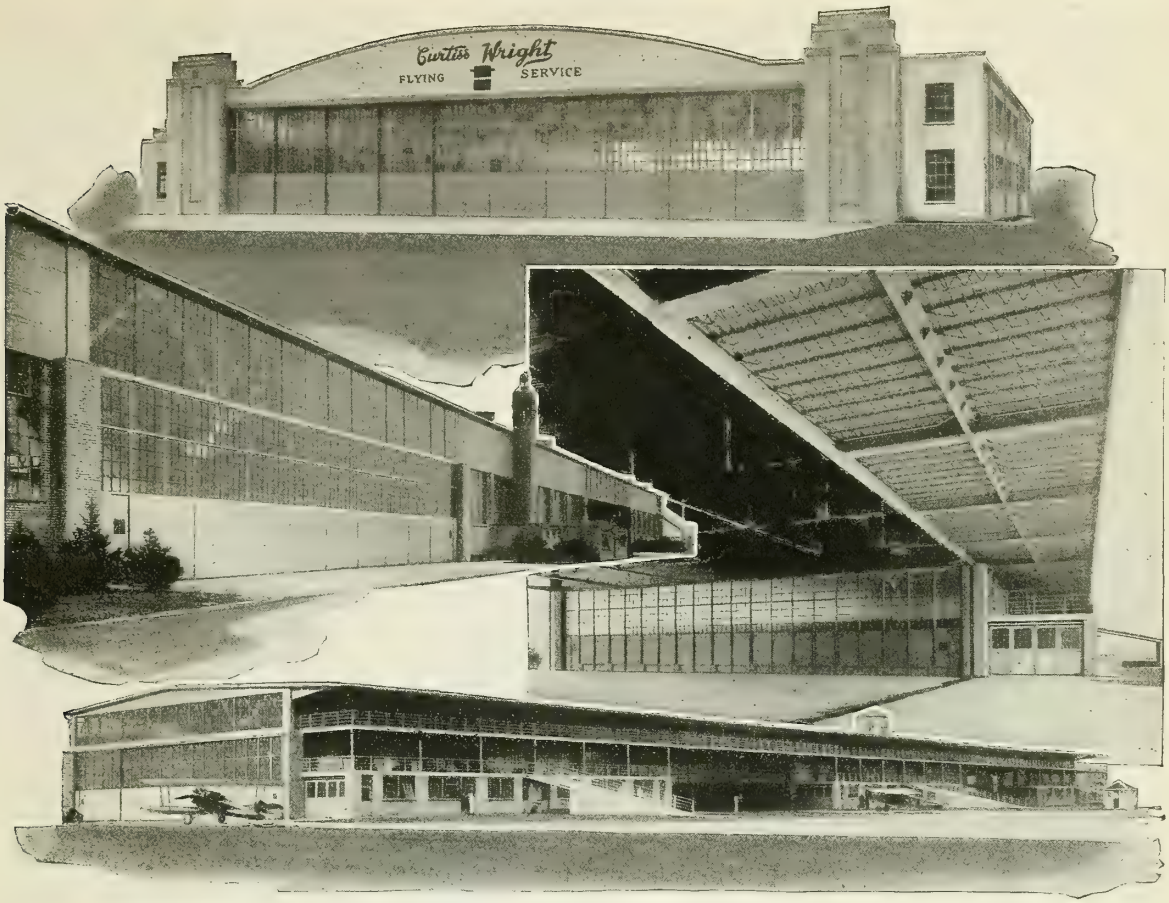
It is planned to prepare the preliminary reports of the census from the returns as received, with little or no verification of the statistics obtained. The final report will be prepared when the returns have been corrected and verified.

The reports will show the ratio between the cost of materials and value of products, the output per wage earner, and the ratio of wages to value of output to enable the manufacturer to compare his own ratios with those of the industry as a whole.

Manufacturers have been requested by the Department of Commerce to coöperate with the Bureau of the Census by making their returns promptly and to correctly answer all questions that apply to their operations.

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Curtiss Flying Service Hangar, Glenview, Ill. Rebori, Wentworth, Dewey & McCormick, Inc., Architects
Truscon products used throughout.

Attractive—Fireproof—Daylighted—Efficient

The specialized requirements of aeronautical buildings are fully met by standardized Truscon Steel Products at economical cost. In the Curtiss Flying Service Hangar, shown above, Truscon Steel Doors are used throughout, including the large Steel Hangar doors, both straight Slide and Curved Track types.

The fireproof roof consists of Truscon Steeldecks, insulated and waterproofed. The floors and roofs are supported on Truscon Steel Joists, "O-T" Open Truss and "P-G" Plate Girder types. The concrete is reinforced with Truscon Welded Steel Fabric and Bars.

Whether interested in individual building products or in complete standardized buildings, write for suggestions, quotations and catalogs.

TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO

Warehouses and Offices in Principal Cities
Truscon Steel Company of Canada, Limited, Walkerville, Ontario
Build NOW While COSTS Are LOW

TRUSCON STEEL BUILDING PRODUCTS
FOR AIRPLANE HANGARS AND AIRPORTS

Say you saw it in AERO DIGEST

PRINCIPLES in SELLING AIRPLANES

By WALTER H. BEECH

President, Curtiss-Wright Sales Corporation

THE business of selling airplanes is just another job of merchandising, similar to any other sales effort. There has never been any new method in selling—the method which has proved successful since the beginning in other industries applies just as surely to aviation selling.

In our opinion, it means simply:

1—Offering in an attractive way, on its own merits, the product you desire to sell.

2—Advertising the product sufficiently to bring it to the attention of the prospective purchaser.

3—Person to person contact to create mutual confidence.

4—Closing the sale and delivering the article exactly as represented.

5—The rendering of service.

The foregoing are the cardinal principles governing all sales effort, and wherever they have been applied in the aviation industry, success of the product and manufacturer has resulted. They must be accepted generally if airplane sales are to reach large proportions.

Any business may become unsound, but it is usually the result of: Misrepresentation, either direct or through advertising; improper analysis of demand followed by overproduction; mismanagement.

These conditions always adjust themselves. People cannot be driven to progress —they must be shown the advantages to themselves of accepting anything new. Residents of a New England city were at one time taxed thirty dollars per annum for the privilege of owning a bathtub; in fact, it was considered improper to feel the need of one. This condition has changed for most of us, but it was not accomplished over night. Now, if the bathtub manufacturer had started mass production before the custom changed, he would have found himself in a position similar to that of the airplane manufacturer last fall.

As soon as there is overproduction the public is reluctant to buy for fear of a price drop. In our business, this condition is rapidly being eliminated; we are getting down to a sound production program and are doing a profitable business. We feel that we are rendering to our country a service similar to that of the steamship, railroad, automobile, telephone, telegraph, radio and other forms of progress that have been developed, in speeding up transportation and communication.

Our contacts are being made through a well organized group of salesmen. Our products are offered on a fair competitive basis of quality plus salesmanship.

This we call selling—but it is really more than that. It is a carefully conceived and directed piece of work. We tell the public what they may expect from our products, in advertising and personal contact. We back this up by delivering equipment that fully meets or exceeds our claims, giving the customer service and making sure of his satisfaction at all times. Manufacturers who have not adhered to these principles have created a bad impression of the industry as well as themselves, in many instances—but they are the ultimate losers.

It takes time to overcome misrepresentation. In our sphere of activity, we are endeavoring to build enough different types to adequately fill every demand. Great care is taken to have the customer buy the type of machine that will best fulfill his requirements and be just what he expects. At the same time, we are building up a service organization that is nation-wide in its scope, with a network of dealers and distributors to tell our story in the way we desire to have it told to the public.

In order to sell people airplanes, we must first concede the fact that they are dangerous if they are not properly used and coach them in the way they should be used. Next, offer them real service and give them an honest dollar for dollar for their investment. There is nothing new about this method—it dates back to the beginning of business.

Minimum Age Set for Airplane Mechanics

THE minimum age requirement of applicants for any class of airplane mechanics' licenses issued by the Department of Commerce has been placed at eighteen years, according to a recent announcement of Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The minimum age requirement for mechanics is contained in a recent amendment to Section 66 of the Air Commerce Regulations. Previous to this amendment the minimum age requirement was not specified in the Air Commerce Regulations.



The Travel Air Mystery S purchased by the Shell Petroleum Corporation

INCREASE OUTPUT OF ENGINE TEST PLANT

THE capacity of the aircraft engine testing laboratory of the Aeronautics Branch of the Department of Commerce, at Arlington, Va., near Washington, will be increased by the addition of a torque stand to the three now in operation and the Department will operate all stands on a double-shift basis, according to a recent announcement of Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

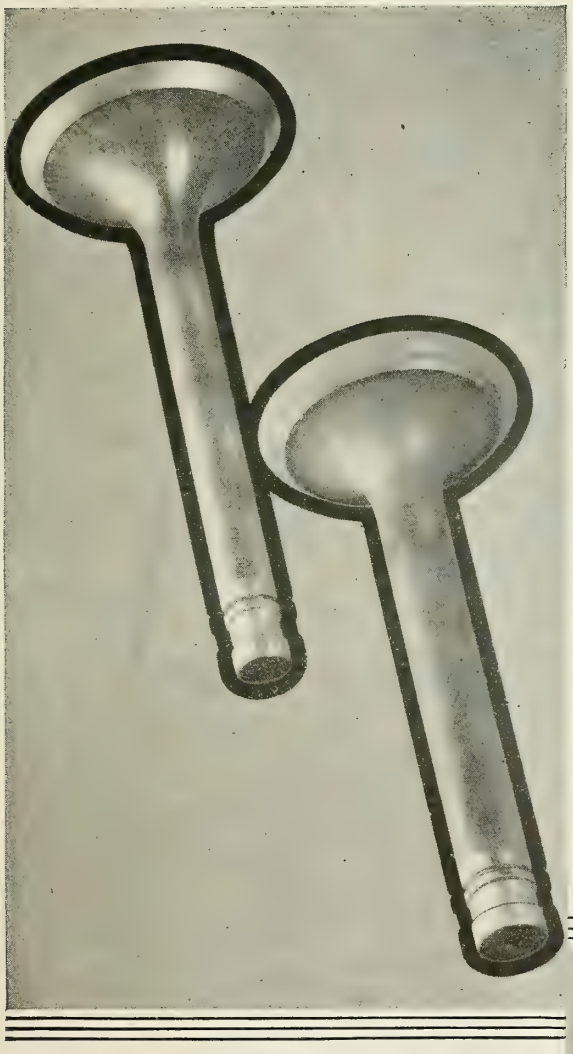
The addition of the fourth test block and the double-shift operation of all four stands entailing the employment of ten additional men, will permit the making of two five-hour runs per day instead the former capacity of one. The new torque stand will be identical with the three already in operation, which were designed for efficiency and speed in mounting, testing and inspecting aircraft engines.

CURTISS EXPORT EUROPEAN TOUR

A FOUR-MONTHS' aerial tour of Europe sponsored by the Curtiss-Wright Export Corporation of New York and organized for the purpose of demonstrating American aircraft to governmental and private representatives of European aeronautics started at Athens, Greece, late in April. The personnel of the tour consists of Lieut. James H. Doolittle, Capt. James H. Cannon and Lieut. James E. Parker, and four planes never before demonstrated in Europe are being used on the tour: the Curtiss Hawk, Curtiss Falcon, Curtiss Fledgling and Curtiss Robin. The planes will be demonstrated in Greece, Turkey, the Balkans, Baltic States, Poland, Switzerland and the Scandinavian countries.

The tour is an effort to broaden the airplane export market of the United States in Europe. All of the countries to be visited are trying to build up their military air services. The first demonstration will be held late in April in Athens before high governmental and military officials. From Greece, the mission will fly through the Balkan countries, Turkey and north to Poland and the other countries on the Baltic. After visits to Norway and Sweden, the planes will be flown across Germany to Switzerland, the last country to be visited before the return about August 1 to the United States. The Hawk and Falcon are powered with Curtiss Conqueror twelve-cylinder V-type liquid cooled engines of 635 horsepower each. The Fledgling has a Wright Whirlwind 225 and the Robin a Curtiss Challenger 185-horsepower engine.

Thompson Valves from Famous Cylinders



Unretouched photograph of two of the 18 Thompson Valves that served in the Angeleno's famous flight. Taken soon after the landing.

(This advertisement is one of a series showing Thompson Valves from some of the historic aero motors that used them in setting new world's endurance records.)

. . . from the "Angeleno"

MORE records than one were broken when the "Angeleno" first touched the ground in July, 1929, after 246 hours in the air. Not only were all former endurance records for *pilots* shattered, but also all previous performances of *engine parts* were far outdistanced.

The Thompson Valves taken from the Angeleno's Whirlwind engine soon after the flight were found to be practically perfect. After opening and closing 11,000,000 times . . . after operating 246 consecutive hours at red heat . . . these valves were still in excellent condition!

This is only one of many outstanding performances that have led to use of Thompson Valves in 95% of all American aero engines.

THOMPSON PRODUCTS, INCORPORATED

General Office: **CLEVELAND, OHIO, U. S. A.**
Factories: **CLEVELAND and DETROIT**

TRADE MARK



Thompson Valves

NEW YORK-BERMUDA FLIGHT SUCCESSFUL

A FLIGHT of approximately 750 miles from New York to Berumda was completed on April 2 by the *Pilot Radio* a Stinson monoplane equipped with Edo floats and radio transmission and receiving apparatus. Effective radio communication and a successful over-night stop on the open sea marked the flight. The crew of the plane included Capt. Lewis A. Yancey, navigator and commander of the flight; Zeh Bouck, radio operator; and William Alexander, pilot.

The ship took off at 9:37 a. m., April 1, on a non-stop flight from New York to Hamilton, Bermuda. About sixty miles north of the destination approaching darkness made a landing advisable after the plane had been in the air for approximately eight hours. After remaining on the water all night the plane took off and completed the flight. Two-way radio communication with New York was maintained while the plane was in the air. The use of a trailing antenna necessitated the interruption of radio communication while the plane was on the water.

The *Pilot Radio* was fitted with a Super-Wasp radio receiver designed for reception of short wave transmission, and a radio transmitter operating on forty-one meters and using a total power of fifty watts. The apparatus is produced by the Pilot Radio and Tube Corporation of Brooklyn, N. Y., and was designed by Mr. Bouck, radio operator on the flight, who has been conducting experimental work on airplane radio for the past two years in conjunction with the Pilot Radio company. Power for the tubes while in flight was furnished by a wind-driven generator which charged auxiliary batteries at the same time.

The *Pilot Radio* is a standard production plane manufactured by the Stinson Aircraft Corporation of Wayne, Mich., and powered with a Wright Whirlwind 300 engine. The ship was not especially prepared for the flight other than being equipped with pontoons manufactured by the Edo Aircraft Corporation of College Point, L. I.

Albert W. Mooney Attempts Non-Stop Transcontinental Flight, Los Angeles to New York

A FLIGHT of approximately 2,000 miles in 22 hours and 27 minutes from Los Angeles, Calif., to Fort Wayne, Ind., was completed on April 5 by Albert W. Mooney at an average speed of ninety miles per hour. He used a four-place low-wing cabin monoplane of his own design, powered with a Kinner engine of 100-horsepower and equipped with a Bendix drive, Scintilla magneto, and Pioneer aircraft instruments.

Mooney took off at Los Angeles April 4 on a non-stop transcontinental flight and was forced down near Fort Wayne by a broken fuel line. The plane consumed 146 gallons of gasoline during the flight at an average consumption of 6.6 gallons per hour. The weight of the plane, including fuel, extra gasoline tanks, parachute, flares, stor-



E. Macauley, aircraft sales manager of the Packard Motor Company

age batteries, luggage and other equipment was 2,850 pounds. The total cost of operation of the plane on the flight was $33 for gasoline and $1.40 for oil. Aviation oil produced by the Deep Rock Oil Corporation was used on the flight.

SEVEN-DAY AIR MAIL SERVICE TO SOUTH AMERICA STARTED

SEVEN-DAY air mail service between the United States, Buenos Aires and Montevideo over a 7,000-mile route was inaugurated on April 26 by Col. Charles A. Lindbergh by a flight from Miami, Fla., to Cristobal, Canal Zone, crossing the Caribbean and stopping en route at Havana and Puerto Cabezas for refueling. The service has been established by Pan-American Airways, Inc., and pilots of the company continued the flight from Cristobal to Buenos Aires. The flight was scheduled to be completed at Buenos Aires on May 2, the return journey to the United States starting on May 3.

A schedule of 1,000 miles a day will be maintained by the Pan-American company, and the same schedule will be held in both directions, the mail arriving and leaving at Buenos Aires and Montevideo every Friday.

Under the system which has been organized by the company, planes will carry mail from the Eastern half of the United States and from Canada to Miami, Fla.; and from the Western half of the country to Brownsville, Texas. From these two cities the routes of the seven-day air mail service extend to the Canal Zone, down the west coast of South America to Santiago, Chile, and over the Andes Mountains to Buenos Aires and Montevideo.

On the flight from Miami to Cristobal to inaugurate the service, Col. Lindbergh used a Sikorsky amphibion owned by the Pan-American company. A co-pilot was carried and the plane was equipped with radio for communication with the shore stations of the Pan-American company. From Havana the flight continued across the Caribbean for 600 miles to the coastline of Honduras, which was followed for a distance of sixty miles, the plane landing at Byrd Field, Puerto Cabezas. The flight then continued for 600 miles to France Field, Canal Zone.

Pilots of the Pan-American company took over the mails which Col. Lindbergh carried and began a series of flights which covered 1,000 miles each day and ended at Buenos Aires on May 2.

Harvard Flying Club Wins Grover Loening Intercollegiate Flying Contest

THE Harvard Flying Club has been awarded the first prize of $1,000 in the first annual competition for the trophy of the Grover Loening Intercollegiate Flying Contest, according to a recent announcement of the contest committee of the National Aeronautic Association which supervised the contest. Flying clubs of seven universities competed for the trophy which is awarded annually to the university flying club with the largest number of hours in the air completed by members in powered planes. The extent of gliding activities, safety records, writing of papers on aeronautics and ground school work was considered in addition to hours flown in the awarding of the prizes.

The second prize of $500 was awarded to the Aeronautical Society of the University of Detroit, and the third prize of $300 was awarded to the Yale Aeronatuical Society. The fourth prize of $200 went to the New York University Flying Club.

The Harvard Flying Club owns its own plane and its membership includes twenty-two licensed pilots who completed a total of 1,155 hours of flying during the period of the contest.

GRAF MAKES A TRIAL FLIGHT TO SPAIN

A 3,200-MILE flight from Friedrichshafen, Germany, to Seville, Spain, was completed on April 17 by the *Graf Zeppelin* under the command of Capt. Ernst Lehman. The trip was made as a trial flight in preparation for the transatlantic voyage from Germany to the United States via Brazil, which the airship is scheduled to make during the latter part of May.

Carrying twenty passengers, the *Graf Zeppelin* took off from Friedrichshafen on April 15 and landed at Seville the following day after a flight of twenty-three hours. After remaining on the ground for approximately an hour, the airship took off on the return journey to Friedrichshafen, which was completed after a flight of twenty-four hours.

OFFICIAL calibration of a new world's altitude record of 23,222 feet for seaplanes carrying a load of 1,000 kilograms (2,204 pounds) established by Capt. Boris Sergievsky in a flight on March 13, has been announced by officials of the National Aeronautic Association. Capt. Sergievsky used a Sikorsky S-38 powered with two

(*Continued on next page*)



Giant Fokker F-32, equipped with Western Electric Airplane Telephone



Western Air Express dispatchers talk at will with their pilots en route

Western Air Express *installs the* Airplane Telephone

WESTERN ELECTRIC radio telephone equipment helps Western Air Express to make its service efficient by keeping pilots and ground personnel constantly in touch.

Western Air Express operates fifteen radio telephone stations for transmitting weather and landing information to pilots, and plans to equip seven more. Twenty-nine Western Air Express planes carry short wave sending and receiving equipment for 2-way telephone communication with company owned ground stations as well as long wave receivers which bring in radio beacon signals and government weather reports.

Western Electric equipment is light, compact, accessible, easily installed and arranged for remote control. It was selected by Western Air Express and other leading air lines because it has proved thoroughly dependable under all flying conditions.

For full information about radio telephone equipment for planes or ground stations, write to Western Electric Company, Dept. 247A.D., 195 Broadway, New York, N. Y.

See the Western Electric exhibit at the New York Show

Western Electric

Aviation Communication Systems

MADE BY THE MAKERS OF BELL TELEPHONES

(*Continued from preceding page*)

Pratt and Whitney engines of 575 horsepower each, taking on and landing at North Beach, Queens, N. Y. The former record of 20,961 feet was established by Franz Kneer at Dessau, Germany, on November 7, 1928.

New Process Developed by Helium Co.

A PROCESS of extracting helium from natural gas which will reduce the price of helium to thirty-five dollars a thousand cubic feet, was recently announced by the Helium Company of Louisville, Ky. The two plants of the company, located at Dexter, Kan., and Thatcher, Colo., have been equipped with facilities for making helium under the new process. The plants have a combined capacity of 12,000,000 cubic feet of helium annually. The new process requires a single operating cycle only.

PHILADELPHIA BUYS HOG ISLAND SITE

THE City Government of Philadelphia, Pa., has purchased Hog Island from the United States Shipping Board at a cost of $3,000,000 and will develop an air-rail-marine terminal on the site which was used as a shipbuilding yard during the war. The site, which is within the city limits, is 846 acres in extent, of which 307 acres will be developed into an airport for landplanes and seventy acres will be used for the establishment of a seaplane base. According to present plans, ocean steamships, air transport planes and transcontinental trains will use the terminal to load and unload passengers and freight.

Tentative Schedule of Events for Chicago National Air Races Announced

A TENTATIVE schedule of events to be held at the National Air Races, Chicago, Ill., August 24 to September 1, has been announced by the Chicago National Air Race Corporation. This schedule will be submitted to manufacturers of aircraft and aircraft engines, and to airplane pilots for criticism and comment and will be revised before the final schedule is completed. Clifford W. Henderson is general manager of the National Air Races, and Maj. R. W. "Shorty" Schroeder is chairman of the race committee.

Cash prizes and trophies will be awarded to the winners of the various contests which will be open to pilots holding transport licenses, F.A.I. certificates and annual sporting licenses issued by the United States Department of Commerce. Planes entered in the events must be of the open-cockpit type accommodating two or more persons, the pilot flying alone; the engine and the plane must have Approved Type Certificates issued by the Department of Commerce; and must be within the cubic inch displacement class as indicated in each event. There will be no restrictions on propeller settings and load requirements. A minimum amount of fuel sufficient for a flight of two hours must be carried.

Included in the proposed schedule of events announced by the Chicago Air Race Corporation will be airplane speed contests, efficiency contests and other events.

SAFETY IN FLYING INCREASES

SAFETY in scheduled airline operations in the U. S. increased seventy-two per cent during the last half of 1929 as compared to the same period of 1928, according to the semi-annual report of the Department of Commerce on aircraft accidents which was made public April 7 by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The report shows an increase of 88,389 in the number of miles flown for each accident in civil aeronautics in the United States during the 1929 period. A total of 78,940,161 miles was flown by civilian aircraft in the United States during this time, representing an increase of about 25,000,000 miles over the same period in 1928.

During the latter half of last year, 15,940,161 miles were flown in scheduled air transport operations. Fifteen fatal accidents were reported during this period, the mileage flown in scheduled operations per fatality during the last half of 1929 being 1,062,677. During the corresponding period in 1928 there were 6,188,838 miles flown in scheduled operations and seven fatal accidents, the mileage flown for each in scheduled operations being 884,120.

The number of miles flown per accident in scheduled air transport operations during the last half of 1929 totaled 209,739, seventy-six accidents being reported. This is compared with 121,350 miles flown per accident during the corresponding period in 1928 when fifty-one accidents were reported.

A total of 63,000,000 miles was flown in miscellaneous operations during the 1929 period, the miles flown per fatal accident amounting to 375,000—168 fatal accidents being reported. During the same period in 1928 the total mileage in miscellaneous operations was 48,000,000, the number of fatal accidents 123 and miles flown per fatal accident 390,244.

The total number of all classes of accidents reported during the last half of 1929 in miscellaneous operations was 848, the miles per accident in miscellaneous operations being 74,292 during this period. During the last half of the previous year 74,883 miles per accident were flown in miscellaneous operations, the total number of accidents reported during this period being 641.

There was one fatal accident in the last half of 1929 for every 431,367 miles flown, as computed from the total mileage flown in all classes of aircraft operations, which was 79,000,000, and the total number of fatal accidents during this period, which was 183. This compares favorably with the same period in 1928 when the total number of fatal accidents in all classes of operations was 130; miles flown totaled 54,188,838; and the total mileage per fatal accident in all classes of flying was 416,837.

Computing mileage flown per accident in all classes of civil aircraft operations and for all classes of accidents during the last half of 1929, the report shows a total of 924 accidents, the total mileage per accident being 85,433. During the corresponding period in 1928, there were 692 accidents, and a total of 78,308 miles per accident for all classes of operation.

Aeronautical Chamber of Commerce Elects Officers for 1930

THE 1930 officers of the Aeronautical Chamber of Commerce were elected at a meeting held on April 16. Frederick B. Rentschler, president of the United Aircraft and Transport Corporation, was re-elected president of the association. The other officers of the Aeronautical Chamber of Commerce include B. F. Castle, treasurer; John R. Cautley, secretary; and Luther K. Bell, general manager. Vice presidents of the chamber and their districts are as follows: Louis H. Mueller, Northwest; H. M. Hanshue, Southwest; Paul Henderson, North Central; C. B. Grosvenor, Northeast; J. T. Trippe, Southeast; Edward S. Evans, East Central; and L. V. Kerber, South Central.

The board of governors for 1930 is as follows: E. L. Cord, H. M. Hanshue, Paul Henderson, Louis H. Mueller, Frederick B. Rentschler, Charles L. Lawrance, G. B. Grosvenor, J. T. Trippe, Carl S. Reed, Fred A. Worthey, Clyde V. Cessna, Edward S. Evans, F. H. Russell, L. V. Kerber, J. C. Hunsaker, H. L. Williams, E. E Aldrin, Charles H Colvin, E. E. Willson, S. L. Gable, J. R. Fitzpatrick, John R. Cautley, Carl B. Fritsche, Reed Chambers, P. G. Kemp, W. E. Metzger, and William P. MacCracken.

Officials of the Chamber voted to award a gold medal to Rear Admiral Richard E. Byrd in commemoration of his expedition to the South Pole. Other members of the expedition will receive silver medals. Col. Charles A. Lindbergh is the only other recipient of this emblem from the Chamber.

F. G. COBURN, a member of the engineering firm of Sanderson & Porter, has been elected president of the Aviation Corporation of Delaware, according to a recent announcement of officials of the company. Mr. Coburn will succeed Graham B. Grosvenor, who will become vice chairman of the board of directors of the Aviation Corporation of Delaware. Sanderson & Porter have been retained in an advisory and management capacity by the corporation.

THE Sikorsky Aviation Corporation recently announced a price reduction of $7,000 on the Sikorsky S-38, a 10-place amphibion powered with two Wasp engines, which will be sold for $49,800. The former selling price of the S-38 was $56,800.

PACKARD-DIESEL AIRCRAFT ENGINE

Detroit to Miami at a fuel cost of less than one cent per mile!

IN a Packard-Diesel equipped plane, Captain L. M. Woolson, chief aeronautical engineer of the Packard Motor Car Company and Walter Lees, test pilot, recently flew from Detroit to Miami, Florida, on *$8.50 worth of ordinary furnace oil.*

The airline distance between the two cities is approximately 1200 miles—which means that the fuel cost averaged less than one cent per mile! Nonstop, the trip was made in 10 hours and 15 minutes.

This flight strikingly demonstrated the economy and reliability of the Packard-Diesel Aircraft Engine. Tested by the Army and approved by the Department of Commerce, it has introduced to Aviation a revolutionary new powerplant.

The Packard-Diesel Aircraft Engine, A. T. C. No. 43, develops 225 H. P. at 1950 revolutions per minute and weighs only 2.26 pounds per horsepower. It starts easily, responds to the throttle instantly, and operates smoothly at all speeds.

Several manufacturers are already offering planes equipped with the Packard-Diesel Aircraft Engine.

Now in quantity production, the Packard-Diesel is available to all commercial aircraft manufacturers.



Captain L. M. Woolson (left), chief aeronautical engineer of the Packard Motor Car Company and Walter Lees, test pilot, with the Packard-Diesel equipped plane in which they made the epochal flight from Detroit to Miami.

PACKARD MOTOR CAR COMPANY, *Master Motor Builders*
DETROIT, MICHIGAN

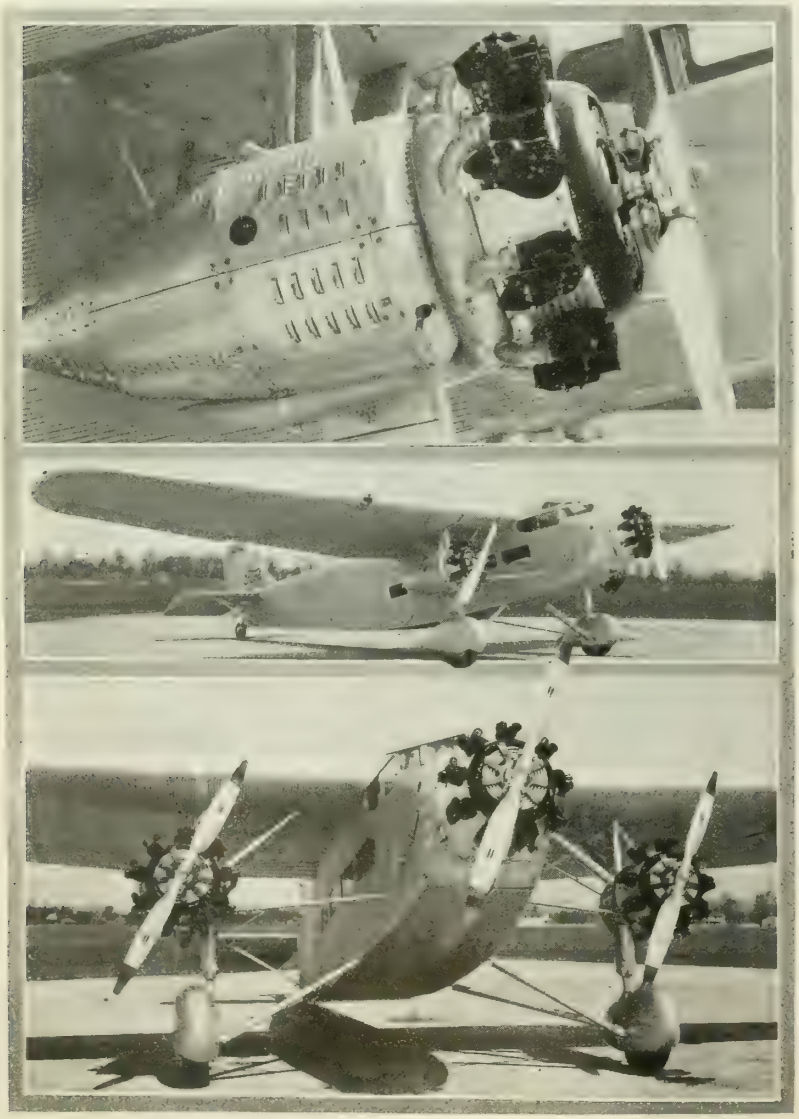
CURTISS AIRCRAFT PLANT AT SANTIAGO

A BRANCH factory for the construction of military and commercial airplanes will be established at Santiago, Chile, by Curtiss-Wright Export Corporation, a division of the Curtiss-Wright Corporation, according to a recent announcement of officials of the Curtiss-Wright Corporation. Shipment of the materials for the construction of the factory has been started.

A steel and concrete manufacturing plant, a hangar of similar construction, and an office building will be built by the company and will be located at Los Cerrillos airport, six miles from the center of Santiago, which will be developed. When completed, Los Cerrillos airport will be more than a mile long, and about one mile wide. About the perimeter of the field will be laid a concrete race track for automobiles and motorcycles, and a clubhouse, containing restaurant, casino and rooms for entertainment, will be built at the flying field.

Under an agreement between the Export Corporation, Commandante Merino, chief of the Chilean air service, and General Blanche, Minister of War for Chile, a group of twenty-five Chilean workmen will come to the United States for a period of training at the Curtiss-Wright plant in Buffalo. At the end of a year they will return to Chile and take over important tasks in the administration and operation of the factory. Fifteen department heads, engineers and foremen of the Buffalo plant will go to Santiago under the direction of Capt. S. C. Coon, to open the factory and undertake the training of native workmen. Captain Coon has been appointed resident manager of the plant, and he will employ, as far as possible, Chilean mechanics and workmen.

At the present time, however, the plant will have a capacity of fifty planes a year and provision will be made for future expansion of the factory. The production of fighting planes will engage the facilities of the plant for the present. Forty planes have been ordered by the Chilean Air Service and will be built in Chile by the Curtiss-Wright Company. Twenty of these planes will be Falcons, and the remainder will be Hawks and Fledglings.



Ford Trimotor powered with Packard Diesel Aircraft Engines

Complete Test Flights of Ford Plane Powered with Packard Diesel

THE first test flight of an all-metal Ford trimotor transport plane, powered with three Packard Diesel radial air-cooled engines, was completed recently at Ford Airport, Dearborn, Michigan, by Leroy Manning, chief test pilot of the Ford Motor Company.

The Diesel engines, which will be optional equipment on the Ford 4-AT transports, are rated at 225 horsepower and, with fuel pumps sets for economical operation, the three engines give a total of 675 horsepower.

The Ford 4-AT transport, powered with the Diesel engines, carries nine to eleven passengers at a cruising speed of one hundred miles an hour and at a high speed of 116 miles an hour. The service ceiling is 14,000 feet and the stalling speed fifty-five miles an hour. The weight of the plane empty is 6,500 pounds, the useful load, 3,630 pounds, and the pay load, 1,774 pounds. The total weight loaded is 10,130 pounds. The wing loading is 12.9 pounds per square foot, and the power loading is fifteen pounds per horsepower.

Announce Rules of Cirrus All-America Derby

RULES of the All-America Flying Derby for light airplanes powered with American Cirrus engines scheduled to start from Detroit, Mich., July 21, have been announced by the American Cirrus Engines, Inc., of Marysville, Mich., sponsor of the race. Prizes of $15,000, $7,000 and $3,000 will be awarded the winners of the first three places. Lap prizes will also be awarded. The race is sanctioned by the National Aeronautic Association. A preliminary announcement of the derby stated that the race would start from New York City.

The race is open to all pilots who hold a license issued by the Department of Commerce in addition to an F. A. I. certificate and an N. A. A. annual sporting license. Any plane powered with an American Cirrus engine is eligible to enter the contest. If two or more engines are installed in any one plane they must not be arranged in tandem. All planes entered in the contest must be at the Detroit Municipal Airport by noon, July 18, and all contestants must wear an approved type of parachute.

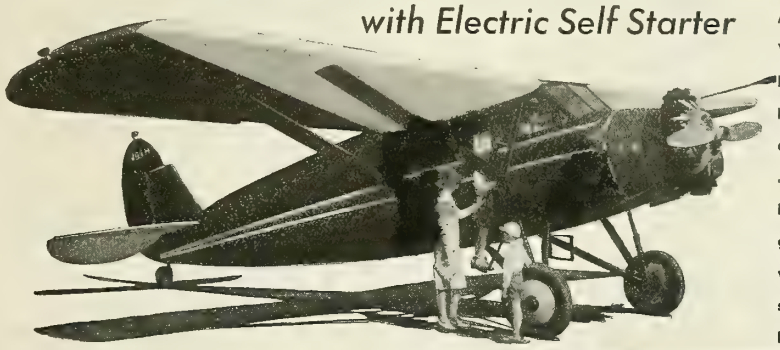
The tentative route of the race is as follows: Detroit, Montreal, New York, Atlanta, Houston, Mexico City, Dallas, El Paso, Los Angeles, Salt Lake City, Omaha, and Detroit. All contestants will be required to land at Laredo, Texas, and obtain the signature of a race official at that point en route to Mexico City and return. No time out will be allowed for this stop.

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STINSON $5775

210 H. P. 4 Place Cabin Plane

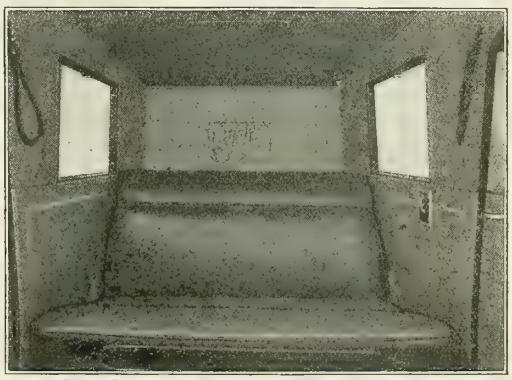
with Electric Self Starter



Adjustable metal propeller... Wheel and emergency parking brakes . . . Cabin heaters . . . Hydraulic and spring shock absorbers . . . Rich broadcloth upholstering . . . Shatter proof glass . . . Rubber insulated motor mount . . . Gasoline gauges...Flying instruments...Dual wheel control . . . Adjustable pilot seats . . . Balloon tire tail wheel . . . Navigation lights . . . Smoking sets.

The Future Becomes the Present

This Stinson plane definitely and exclusively establishes a totally new standard of value. Its price puts it within reach of thousands of new buyers, completely changes the competitive situation, and establishes the selling of airplanes upon a sound and profitable basis. The most important thing in the airplane business today is *people*. High prices have been the main reason that more people have not bought and used airplanes. The alliance of Stinson with the Cord Corporation has made possible a volume manufacturing program resulting in better planes of greater value at sensationally low new prices. Stinson is able to do things never before possible in the aviation industry because of its financial strength, production experience, resources and great buying power. Stinson backs up its dealers with sales help and national advertising that *creates* buyers' demand, quick turnover, volume sales and definite profits. Stinson is doing much more than building airplanes—Stinson is *building a business*. The success of Stinson's program to date is only a hint of what the future holds for those who have the Stinson franchise.



Interior finish of the new Stinson 4-Place Junior cabin plane is similar to that of a fine motor car. Cushions are deep and luxurious. Cabin is ventilated, sound proofed and equipped with two hot air heaters.



Unusually wide range and unobstructed vision. Note the dual wheel control and the position of the instruments. The wide aisle and roominess of two front seats afford unusual freedom of action.

Stinson Aircraft Corporation, Wayne, Michigan
Division of Cord Corporation

4-Pass.—225 H. P. Wright—$8,495 • 4-Pass.—225 H. P. Packard Diesel—$8,995 • 4-Pass.—300 H. P. Wright—$10,495 300 H. P. Wasp—$10,695 • 6-Pass.—300 H. P. Wright—$10,995 • 300 H. P. Wasp—$11,195 • 8-Pass.—425 H. P. Wasp—$15,995 Stinson Airliner—10-Pass. Tri-Motored Transport—$23,900 • Prices F. O. F. Wayne, Michigan • Equipment other than standard, extra.

DEALER franchise still open for right men in some localities

(*Continued from preceding page*)

Each town designated a stop on the route will be a control point and the total elapsed time of contestants will be computed as the number of hours between these points. Contestants may land between these control points but no time out will be allowed for such landings.

A four-page folder outlining the detailed requirements and an entry blank may be secured by writing the American Cirrus Engines, Inc., Marysville, Michigan. Entries will cose July 7th.

Thompson Trophy Race on Labor Day

THE first annual Thompson Trophy Race sponsored by the Thompson Products, Inc., of Cleveland, Ohio, will be held at Chicago on Labor Day, September 1, and will consist of ten laps about a five-mile course, according to a recent announcement of officials of the company. The race will be a free-for-all speed contest for any type ship, with any type engine or engines and is sanctioned by the National Aeronautical Association.

R-101 Completes Trial Flights in Preparation for Transatlantic Voyage

A SERIES of twelve-hour trial flights have been completed at Cardington, England, by the dirigible R-100 in preparation for a transatlantic flight from England to Montreal, Canada, and return, scheduled to take place in May, according to a recent announcement of the Air Ministry. No passengers will be carried on the east-west journey.

THREE women flying students without previous flying instruction completed dual instruction and successfully soloed in from six to seven hours at the Roosevelt Aviation School, Roosevelt Field, L. I., on March 29, according to a recent announcement of officials of the Roosevelt school. The course began with a series of lectures, followed by dual instruction in the air, each student soloing after being checked by an instructor other than the one she had flown with during the day.

The students were Miss Dorothy Galbreth, who soloed after six hours and ten minutes of dual instruction; Miss Esther Wagner, after six hours and thirty-five minutes; and Mrs. Helen Gillespie, after six hours and fifty-five minutes.

THE annual report of the Aviation Corporation, of Delaware, covering the period since incorporation, March 1 to December 31, 1929, has been announced by Graham B. Grosvenor, formerly president of the company. Cash, call loans and marketable securities at cost totaled $21,505,856.57, or $6.96 a share of capital stock in the hands of the public. Current assets were $23,250,227.33, giving a ratio to current liabilities of fourteen to one. Net working capital amounted to $21,593,381.58, or $6.99 a share.

GUY W. VAUGHAN has been elected president of the Wright Aeronautical Corporation. He succeeds Charles L. Lawrance who is now vice president of the Curtiss-Wright Corporation in charge of engineering. Mr. Vaughan was formerly vice president and general manager of the Wright Aeronautical Corporation where he placed in production the Whirlwind models designed by Mr. Lawrance. Mr. Lawrance will devote his time to the development of new types and the improvement of present types of engines and planes.

AT a meeting of the Board of Directors of National Air Transport April 25, F. B. Rentschler, president of United Aircraft & Transport Corporation was elected chairman of the board and president, and J. F. McCarthy, secretary and treasurer. The resignations of Howard Coffin, chairman; C. M. Keys, president; Charles L. Lawrance and C. T. Ludington, vice presidents; and J. J. Mitchell, secretary and treasurer, were accepted. A sufficient number of the old directorate also resigned to enable United to control the board.

THE name of the Shaffer Oil and Refining Company has been changed to the Deep Rock Oil Corporation, according to a recent announcement of John L. Gray, vice president and general manager of the company. The corporation will continue as a unit of the Standard Gas and Electric Company.

DR. HUGO ECKENER was recently awarded the special medal of the National Geographic Society which has been given to but ten other men in forty-two years. The medal was awarded to Dr. Eckener for his work in furthering the progress of airships and to commemorate the first around-the-world flight of the *Graf Zeppelin* in 1929 under his command.

HAWKS COMPLETES GLIDER FLIGHT

A TRANSCONTINENTAL flight in the glider *Eaglet*, towed by a powered plane, was completed at New York City on April 6 by Frank M. Hawks after a flight of eight days on which nineteen scheduled stops were made en route. A distance of 2,860 miles was covered in a total of thirty-six hours and forty-seven minutes in the air. Gliding demonstrations made at the stops en route totaled seven hours and twelve minutes in the air. The flight was sponsored by the Texas Company to promote interest in gliding and aviation on the part of the general public, and was completed on schedule although severe weather was encountered on several legs of the journey.

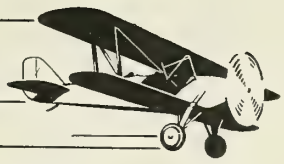
Attached with 500 feet of cable to the *Texaco No. 7*, a Waco biplane piloted by J. D. "Duke" Jernigin, Jr., the *Eaglet* began the transcontinental flight on March 30 at Lindbergh Field, San Diego, Calif. After a flight of two hours and nineteen minutes the ships landed at Yuma, Arizona, to refuel the biplane. The flight then continued to New York City, stops being made en route

(*Continued on next page*)



(Left) Fuselage of Emsco thirty-five place four-motored monoplane in jig. (Right) Partially completed nacelles for 4 Wasp engines

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(*Continued from preceding page*)

to refuel the biplane and to give glider demonstrations in addition to the over-night stops.

Wallace Franklin, who accompanied Jernigin in the biplane on the flight, designed the glider in coöperation with his brother, Prof. R. E. Franklin of the University of Michigan. The *Eaglet* is a cabin glider of the monoplane type. The cabin of the glider was equipped with a telephone using a telephone line supported by the tow cable and providing communication between the glider and the plane. The telephone line and the cable were released by means of a special mechanism when the glider cut loose from the airplane in making landings.

New York Glider Carnival Is Postponed Until June by Committee

POSTPONEMENT of the New York Glider Carnival till late in June was announced recently by the committee in charge of the meet. The event was originally scheduled for April 25 and 26 at Bayside, L. I.

The Carnival was postponed to give a number of glider organizations entered in the contests time to complete the construction of gliders with which they will compete and to enable a number of the collegiate glider organizations to take part in the event. The program of fourteen events for novice, second and first-class glider pilots will remain the same as scheduled for the earlier date. The schedule of events appeared in the April issue of AERO DIGEST.

A glider exhibition is scheduled to be held in conjunction with the New York Aircraft Salon, May 3-10, by the National Glider Association. Capt. Frank Hawks, who recently completed a transcontinental glider flight; Lieut. Ralph Barnaby, of the Naval Air Service; W. Hawley Bowlus, holder of the American glider record; and Miss Amelia Earhart have been invited to participate in the exhibition.

New York Glider Meet Held May 1-2

THE New York Glider Meet will be held at the Queensborough Golf and Country Club, Bayside, L. I., May 1-2 under the auspices of the National Glider Association and the Aeronautical Chamber of Commerce, according to a recent announcement of officials of the arrangement committee. The schedule of events will include the following: Duration contest open to third class and second class glider pilots in primary and secondary gliders; duration flight for first-class pilots using primary gliders; and landing on a mark contest open to all glider pilots and motored pilots licensed by the Department of Commerce.

A GLIDER and a powered plane will be purchased by the Dartmouth Aeronautical Society of Dartmouth University, Hanover, N. H., according to a recent announcement of officials of the association. The society was organized in 1929. Weekly meetings are held and a school is conducted for the instruction of members in aviation ground school subjects.

COMING AERONAUTICAL EVENTS

May 3-10. New York Aircraft Salon, Aeronautical Chamber of Commerce, Madison Square Garden, New York City, N. Y.

May 9-10. Second Iowa Aeronautics Conference, Iowa State Colleges, Ames, Ia.

May 14-16. National Airport Conference, Airport Section, Aeronautical Chamber of Commerce, Statler Hotel, Buffalo, N. Y.

May 18-June 1. Italian Air Exhibition, Bologna, Italy.

May 19-22. Fourth National Aeronautical Meeting of American Society of Mechanical Engineers, Dayton, Ohio.

May 24-25. Second Annual Tracy Air Show, Tracy, Calif.

May 28-June 1. New England Air Tour, Dedication of Bowles Airport and Air Races sponsored by the Springfield Chapter of N. A. A., Springfield, Mass.

May 29-30. Gardner Cup Races for Balloons, St. Louis, Mo.

May 30-31. New York State Model Airplane Meet, Binghamton, N. Y.

May 30-June 8. Pennsylvania State Air Tour, sponsored by Aero Club of Pennsylvania and Pittsburgh Aero Club.

June 2-7. Northwest Aircraft Exposition, Coliseum midway between Minneapolis and St. Paul, Minn.

June 3. Eastern Ontario Air Meet, Kingston, Ontario.

June 3. Second Annual Field Day of Ottawa Flying Club, Ottawa, Canada.

June 10-15. Celebration of 25th Anniversary of the F. A. I., Paris, France.

June 12-13. Michigan State Conference on Airports. Traverse City, Mich.

June 20-21. Dedication of Randolph Field, U. S. Army Air Corps Training Center, Randolph Field, Texas.

June 28-July 6. Pacific Coast Aeronautical Exhibition, sponsored by Capt. Bill Erwin Post, American Legion, and the Aeronautical Chamber of Commerce, Oakland, Calif.

June 28. Annual British Royal Air Force Display, Hendon, England.

July 3-5. Western States Aeronautical Conference, Medford, Oregon.

July 4. Dedication of Kelso, Wash., municipal airport.

July 6. Beginning of International Transportation Exposition, Poland.

July 20. Start of "Challenge de Tourisme Internationale" from Berlin-Tempelhof Airport, Berlin, Germany.

July 21. Start of All America Flying Derby for American Cirrus powered planes from Detroit, Mich. Sponsored by American Cirrus Engines, Inc.

August 18-20. National Air Parley, sponsored by the Air Law Institute, Chicago, Ill.

August 23-September 1. National Air Races, Chicago, Ill.

August 30-September 1. James Gordon Bennett Balloon Race, Cleveland, Ohio.

August 30-September 1. Dedication of the Williamson-Johnson Airport, Duluth, Minn. Postponed from July 4-6.

September 1. First Annual Thompson Trophy Race, Chicago, Ill.

September 1-6. Fifth International Air Congress, The Hague, Holland.

November 27-December 14. Aeronautical Salon, Paris, France.

December 10-23. International Congress of Aerial Security, Paris, France.

NEW YORK

THE general offices of Air Associates, Inc., have been moved from New York City to Roosevelt Field, Garden City, L. I., where the corporation will be managed and the eastern activities of the company will be concentrated. The offices are located adjacent to the stockrooms, store, repair shops and customers' service hangar which have been established at Roosevelt Field by Air Associates.

Edo Production Increase in 1929

SALES of seaplane floats manufactured by the Edo Aircraft Corporation of College Point, Long Island, N. Y., increased four hundred per cent in 1929 over 1928 sales, according to a recent announcement of officials of the Edo corporation.

THE New York State Model Airplane Meet will be held at Binghamton, N. Y., May 30 and 31 under the auspices of the Binghamton Aero Club in coöperation with the Binghamton chamber of commerce. The meet will be held under the rules of the A. M. L. A. and the high point winner of the contest will represent New York State in the National contest which is scheduled later in the year.

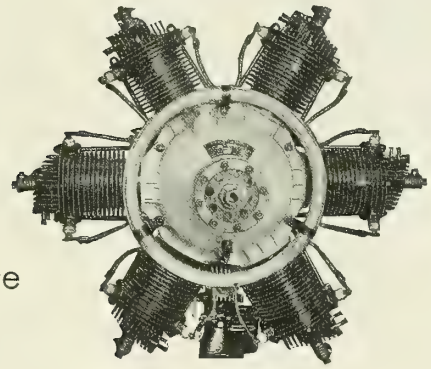
An outdoor airplane model contest will be held at Bennett Field on the afternoon of May 30, and an indoor meet will be held on the morning of May 31 at the State Armory. A silver cup will be awarded to the club scoring the highest number of points.

CEDRIC FAUNTLEROY was elected president of the Consolidated Instrument Company of America, Inc., at a recent meeting of the firm's board of directors. Mr. Fauntleroy is president of the Federal Aviation Corporation of New York, and succeeds Joseph Leopold as president of the

(*Continued on next page*)

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(New York News continued)

Consolidated company. Mr. Leopold will head the General Motive Control, Inc., of New York, a holding company operating companies making mechanical and electrical devices.

CAPT. ARTHUR BUSSY has been appointed director of operations of Gates Flying Service, Grand Central Air Terminal, New York City. Capt. Bussy was formerly assistant operations manager of the Gates company and succeeds Capt. Edward Brooks as operations director.

GROSS sales of the subsidiary companies of the Fairchild Aviation Corporation increased from $2,656,000 in 1928 to $3,494,000 in 1929, according to a recent announcement of officials of the company. Fairchild is a division of the Aviation Corporation.

ROOSEVELT AVIATION SCHOOL took delivery recently on a new Aeronca C-2, powered with a 30-horsepower Aeronca motor, and produced by the Aeronautical Corporation of Cleveland, Ohio. The Roosevelt school will use the ship for training purposes. The light plane was flown from Cincinnati to Long Island in ten hours, ten minutes, with one stop near Plainfield, N. J.

THE Richfield Oil Corporation of New York has been awarded a contract by the Navy Department for 1,892,000 gallons of Richfield aviation gasoline for immediate delivery on the Atlantic Seaboard. The company is a subsidiary of the Richfield Oil Company of California.

THE C. J. Tagliabue Manufacturing Company of Brooklyn, N. Y., makers of recording instruments, has acquired the American Tobacco Company property on Park Avenue, extending from Nostrand Avenue to Sanford Street in Brooklyn. The Tagliabue company will move to the new location from Bush Terminal.

A LECTURE on the proper use of lubricants for aeronautical engines was given recently by F. L. Reynolds of the Vacuum Oil Company to the students in the ground school course conducted by the Sunrise Flying Club of Ozone Park, L. I. The course extended from February 19th to May 2nd, and included lectures on aircraft engines, navigation and meteorology. Every subject necessary to pass the written examination for a transport pilot's license was covered in the course, a trial examination being given at the last session of the course.

JAMES C. ELVERSON has been appointed general manager of the American Viscosimeter Company, Inc., New York City, a subsidiary of the General Motive Control, Inc., according to a recent announcement made by officials of the American company. Mr. Elverson was formerly general manager of the Motometer Company of New York

Flying Clubs in the Niagara Region

By A. SHEPHERD

THERE are now seven private flying clubs active in the Niagara Region. Six of these operate from the Buffalo Municipal Airport—Prop and Wing, Elm Aviation No. 1, Elm Aviation No. 2, Rome Club, 106th Field Artillery Club, and the Eaglerock Club. At St. Catherine's, Ontario, across the Niagara River, the Canadian subsidized St. Catherine's Flying Club is active. As Buffalo is a center of activity in the aeronautical industry, including as it does manufatcurers of Army and Navy service type craft and commercial landplanes and flying boats, students have the opportunity of observing at first hand many phases of aeronautical activity. The success and methods of operation of these clubs are indicated by the records of the Prop and Wing, Elm Aviation No. 2, 106th Field Artillery, and St. Catherine's organizations.

The Prop and Wing Club was organized in the fall of 1927 by employees of the Curtiss Aeroplane and Motor Company, Inc., under the supervision of Arthur Nutt. There were twenty-three members in the club in April, 1928, each of whom contributed $50 for the purchase of a Jenny to be used for training. After the plane failed in a demonstration, members voted to purchase a new ship and $200 which they had given as part payment on the Jenny was credited to them on the purchase of an Eaglerock. The club began flying activities in June, 1929, with about twenty members, each of whom had contributed $100 for the purchase of the plane.

Leonard Huck was appointed instruction pilot of the club and gave each member his first two hours of dual instruction.

It was decided that student pilots taking dual instruction should be given preference over members flying solo. A charge of $3 per hour was made for flying and each student was assessed dues of $1.50 per week to cover the expenses of maintaining the plane. Students paid the instructor for tuition at the beginning of each flight. Members affiliating with the club after the purchase of the plane were charged an initiation fee of $100 in addition to back dues.

Herbert Shebat succeeded Mr. Huck as instructor and soloed all but two of the club members. At present there are three licensed private pilots in the Prop and Wing Club; five who are ready to take the examination given by the Department of Commerce; and seven who have not completed the ten hours of solo flying required to take the Department of Commerce examination for a private pilot's license. The average dual instruction time for each member has totaled about nine hours, and has included instruction in spins and recovery before solo.

The plane which the Prop and Wing Club uses for instruction of members has completed approximately 400 hours in the air without accidents or major repairs. Officers of the Prop and Wing Club include Milton Fox, president; Seth Prince, vice president; W. H. Murgi, secretary; and C. Albertsman, treasurer.

The Elm Aviation Club No. 2, Inc., was organized with ten members in October, 1928, and purchased an Eaglerock biplane the following month, each member contributing $350 for the purchase of the plane. During the first six months of operation ground school instruction was held once each week, with Leo Chase as instructor of the club. During 500 hours in which the plane has so far been in the air, all ten members of the club have soloed. There are seven private pilots and one limited commercial pilot in the club. The only damage to the ship in this time has been a broken propeller and a broken wheel. The members do not pay dues but are assessed each month one-tenth of the cost of maintainance of the plane.

Officers of the Elm Aviation Club No. 2 are R. Buckelkamp, president; Bowman Otto, vice president; and C. Gellert, secretary-treasurer.

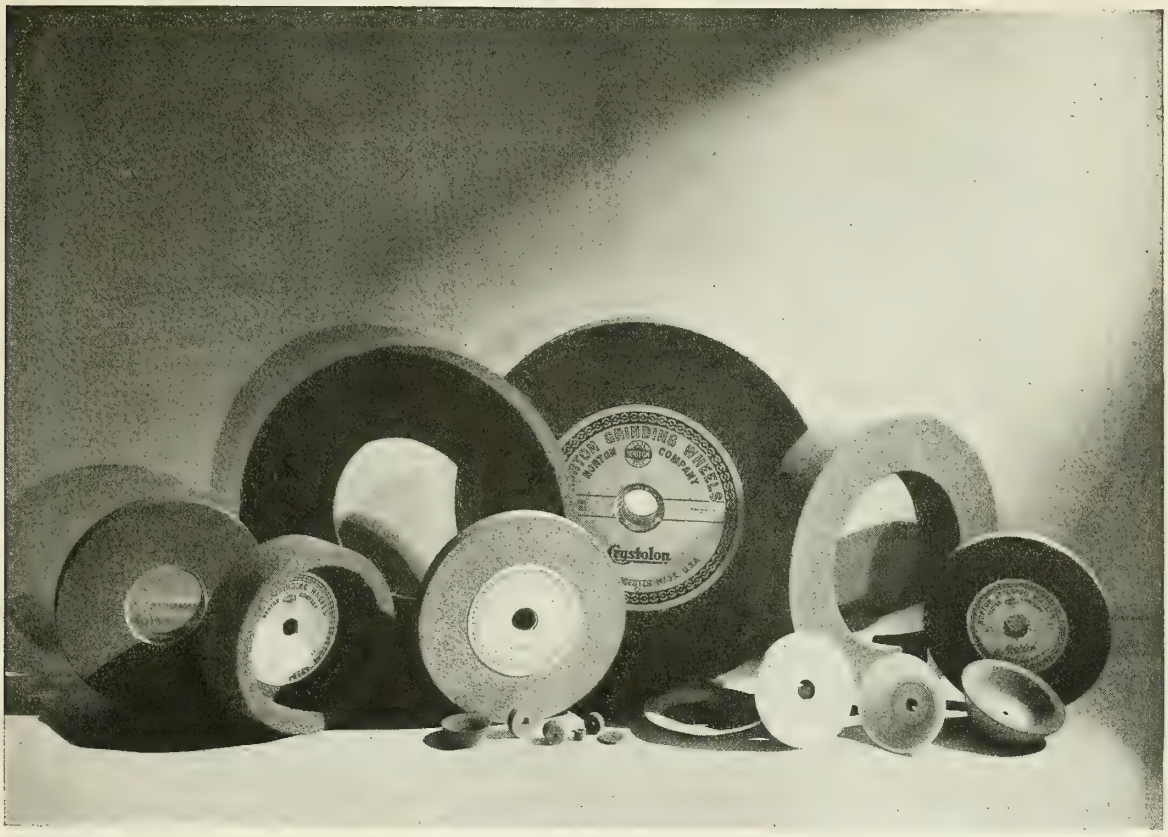
The 106th Field Artillery Aviation Club was organized two years ago by a group of former war-time pilots who were officers in the local regiment. For the first six months after its inception, activities of the organization were limited to a weekly discussion and ground school conducted by Major John Goetz, the originator and founder of the club. On May 15, 1929, the club purchased its first plane. At the same time, in order to increase the scope of action, membership was opened to the general public. Although the original name was retained with permission of the military authorities, the membership was enlarged from the original eight charter members to over sixty fully paid flying members, maintaining a fleet of six planes.

During 1929 the club soloed thirty-eight student pilots, twenty-seven of whom now hold Department of Commerce pilot licenses The 106th Club is now the largest coöperative flying club in the United States. The present governing body consists of Major John Goetz, president; Theron DeRosia, first vice president; Art Devlin, second vice president; Lieut. Clarence Nichols, treasurer; Cecil Clark, secretary, and William Southwood, Steven Jurns, Jack Dresher, Sellew DeWitt and Fred Crozier, directors.

A contrast in the methods of operation is shown by the operation of the St. Catherine's Flying Club. Members of the St. Catherine group who have not had flying experience in the Canadian air service are charged a membership fee of $25, and pay $15 per hour for dual instruction, and $12 per hour for solo flying. Members who flew in the military service are charged an initiation fee of $15 and are permitted to fly in the club planes at the rate of $8 per hour. It is possible, therefore, for members to obtain a private pilot's license at a cost of about $295.

The Canadian Department of National Defense loans, without charge, two D. H. Moths, powered with Cirrus four-cylinder air-cooled engines to the flying clubs under

(Continued on next page)



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(*New York News continued*)

its supervision. In order to receive two of these ships from the department, a club is required to have at least thirty members, ten of whom have not had previous flying experience, to employ a flying instructor approved by the department, to show financial responsibility, and to acquire hangar and landing space. The club receives from the department a premium for each member qualifying for a private license. The government will donate additional planes to flying clubs when it is shown that there is a need for them, one plane being given to the club for each one which the club purchases outright. These government planes are not permitted to engage in commercial activity in competition with other operators, but may be used to give rides to honorary members of the clubs.

CENTRAL NEW YORK

[M. MARVIN]

S. S. AUCHINCLOSS, official of the General Aviation Corporation, has devised an airplane telephone system by means of which instructors can communicate with students during training. The system is operated from the plane's battery. It is of light weight and consists of a transmitter installed in the instructor's cockpit, a receiver which is worn by the student under his helmet and a few feet of wire. Mr. Auchincloss is a graduate of Massachusetts Institute of Technology. The new airplane telephone system will be regular equipment on the training ships of General Aviation Division of Eastern Aeronautical Corporation at Amboy-Syracuse Airport.

JOHN G. HUNTER, Syracuse business man and owner of a new Buhl Air Sedan, recently announced plans for the operation of the Cortland, N. Y., airport this year. Mr. Hunter plans to take over the Cortland field and organize flying classes in that city. Lieut. Harold Mull will be in charge of operations and will organize flying classes and serve as chief instructor.

ANNOUNCEMENT was made recently of the resignation of Leonard Huch as chief mechanic of Empire Air Transport, Syracuse, N. Y. He will return to the Curtiss Aeroplane and Motor Company's plant in Buffalo to work on Curtiss fighters.

The course extended from February 19th to May 2nd, and included lectures on aircraft engines, navigation and meteorology. Every subject necessary to pass the written examination for a transport pilot's license was covered in the course, a trial examination being given at the last session of the course.

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NICK HARRIS was recently appointed dealer at the Amboy-Syracuse Airport for six airplanes. He will handle the Waco, Monocoupe, New Standard, Great Lakes, Travel Air and Stinson lines.

PLANS are under way to spend nearly $200,000 in the further development of the Curtiss-Wright property and facilities at Amboy-Syracuse Airport. Gordon K. Hood, general manager of the Syracuse Branch of the Curtiss-Wright Flying Service, recently said that additional equipment will be purchased as soon as plans for the hangars are completed. A bid will be made for the Empire Transport hangar, but, in case of failure to secure that, the organization will build a new hangar costing approximately $125,000.

The Syracuse branch will include one of the Curtiss-Wright transport schools. The transport course includes day and night piloting in multi-motored planes. The addition of at least one trimotored plane to the fleet of the Syracuse Branch of Curtiss-Wright Flying Service, Inc., is expected to be made in the near future.

The decision of Mayor Rolland B. Marvin and other city officials, including the manager of the municipal airport, R. L. "Pete" Kincaid, to enlarge the field through removal of the present highway along the north side of the field, influenced the Curtiss-Wright firm to continue its Syracuse branch and to make it one of the three more important in the United States. Work on the new highway is expected to be started at once.

THREE Syracuse glider enthusiasts have been named by the National Glider Association to select a site in Central New York for the national glider meet to be held in September. The three are Martin Schempp, glider pilot and instructor of the Syracuse Glider club, Jack Herrick and H. A. Reynolds. The National Glider Association has definitely decided to stage the meet in New York State, as topographical surveys indicate that this state is better suited for gliding than any other.

According to Donald F. Walker, of the National Glider Association, about 100,000 glider enthusiasts are expected to be attracted to the meet. Outstanding glider pilots of both America and Germany will fly during the meet, demonstrating soaring and training craft.

ANNOUNCEMENT has recently been made of the appointment of Fred T. McGlynn, chief pilot of Syracuse Branch, Curtiss-Wright Flying Service as test pilot for General Electric Company in Schenectady. General Electric Company has entered into the airplane accessories manufacturing field and are experimenting with several instruments.

Mr. McGlynn's work will consist of test flying planes equipped with new instruments. One of his first assignments will be the testing of the radio beacons being manufactured by the General Electric Company. Two new Stinson cabin monoplanes and a Waco have been purchased by General Electric Company.

PLANS were recently announced by Nick Harris to inaugurate a Syracuse-Clayton airline. Mr. Harris plans to operate two planes each way daily. A ship will leave Clayton at 7:30 a. m., arriving at Syracuse at 8:30 a. m. The ship will return immediately, completing the trip at 9:30 a. m. The afternoon plane will leave Clayton at 4:30 p. m., arrive at Syracuse 5:30 p. m. and be back in Clayton at 6:30 p. m. A cabin plane will be used.

licensed private pilots in the Prop and Wing Club; five who are ready to take the examination given by the Department of Commerce; and seven who have not completed the ten hours of solo flying required to take the Department of Commerce examination for a private pilot's license. The average dual instruction time for each member has totaled about nine hours, and has included instruction in spins and recovery before solo.

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RHODE ISLAND

[T. F. BRESNAHAN]

ALTHOUGH no definite announcement has been made by the Curtiss-Wright Flying Service, it is understood that the base of the company at the What Cheer Airport, Pawtucket, will close during the next few weeks. The Pawtucket Chamber of Commerce having been assured by Nicholas Bertozzi, head of the What Cheer Airways, Inc., owners of the What Cheer Airport in Pawtucket that he will operate the field at least two years more as a private venture, has appointed a committee composed of Charles H. Lawton, Jr., C. Earl Hays, Charles G. Greenhalgh, Harold Cohen, George A. Cumming and George C. Clarke, to begin a campaign with the purpose of interesting the City of Pawtucket in the

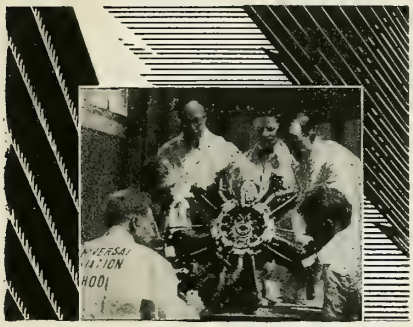
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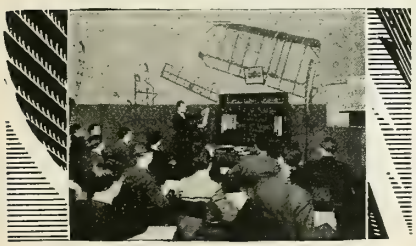
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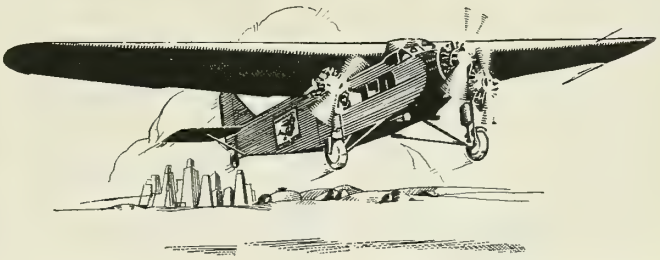
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Universal Aviation Schools are a division of the American Airways, Inc., the world's largest air transportation system. This system is constantly opening new routes and employing additional men. Universal graduates are given first consideration whenever new men are employed. And other large air transportation systems, airplane manufacturers and aviation supply houses, knowing the high type of training offered in Universal Aviation Schools, turn to our employment department for men with aviation training.

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Universal Aviation Schools are among the few that are government rated and approved. This means that all equipment, instructors and methods of instruction in Universal Schools meet the Department of Commerce requirements. In addition, to retain government approval, these schools must turn out graduates who meet the department's high standards. For this reason only men with satisfactory qualifications are accepted in Universal Aviation Schools. Among the courses offered are: Flying, Mechanics, Welding and General Aviation Business Administration. Also an excellent home study course in Aviation.

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(Rhode Island News continued)

purchase of the What Cheer field as a municipal venture. The field is one of the most central in the state, and has been improved until it is recognized one of the best in New England. There is some indication that the city will eventually buy it. Its valuation is set at approximately $200,000.

WORK on the airport at Woonsocket, R. I., is progressing, and there is every indication that it will be in operation by June or July. The field will provide an excellent landing surface when finished although the runways will not be long enough for trimotored planes.

ACTIVITIES at Charlestown, R. I., field are beginning, and the management expects the biggest year in its history. This field, one of the first in the state, has always enjoyed good business. H. Colvin, owner, is among the most popular operators in the state.

MASSACHUSETTS

PRIZES and events for the two-day air race included in the dedicatory ceremonies of Bowles Airport, Springfield, Mass., May 31-June 1, were announced recently by the Springfield chapter of the National Aeronautic Association, sponsor of the race. The dedicatory ceremonies will be held following the completion at Bowles Airport of the New England Air Tour which will be held May 27-30 under the direction of the New England Council of the N. A. A. The air tour and the races have been sanctioned by the National Aeronautic Association.

Seven thousand dollars in prizes will be awarded the winners of nineteen events which will be included in the air races. These events will include speed races for various type planes, dead stick landing and parachute jumping contests, and an airplane model contest. Demonstrations by planes of the Army Air Corps, Air Corps Reserve, and the Naval Air Service are scheduled.

Work of mapping the route of the air tour and inspecting the airports and intermediate landing fields on the course was recently started under the supervision of the New England council.

THE Old Colony Flying Club, located at Muller Field, Revere, Mass., recently purchased an Eaglerock plane from the Massachusetts Airways Corporation of Springfield, Mass. Members of the club will use the plane to take flying instruction, which will be supervised by Winsor Harlowe, chief pilot of Old Colony Airways located at Muller Field. Members of the Old Colony Flying Club include H. H. Morgenstern, R. C. Queen, C. P. Medros, A Zwink, and George C. Clapp.

THE Department of Commerce and the Massachusetts Supervisor for Aviation now have comfortable offices in the new administration building at the Boston Municipal Airport.

CONNECTICUT SCHOOL OF AVIATION MEDICINE IS ORGANIZED

A CIVIL school of aviation medicine, which will train physicians to supervise physical examinations of licensed airplane pilots and applicants for pilots' licenses within the State, has been established by the Connecticut Department of Aeronautics. The school has been in session since the first of the year and is under the supervision of the State Chief Flight Surgeon who is aided by an advisory committee.

The school was inaugurated in a program of developing the organization of the Chief Flight Surgeon, which is to include the establishment of stations throughout the State where applicants for pilots' licenses may be examined. Graduates of the school will be detailed to these stations.

The course is based on the correspondence course recommended by the School of Aviation Medicine of the United States Army Air Corps, and instruction is divided into three phases covered during a period of one year. The first phase of the course includes the assignment of lessons in the aviation medicine correspondence course, physicians enrolled in the school being required to complete these lessons within a given period of time. The second phase of the work is given at the headquarters of the State Department of Aeronautics at Brainard Field, Hartford, Conn. The school is in session four hours once every three weeks. The students are required to report to this school where they are given practical work in aviation medicine which includes demonstrations of apparatus used in examining applicants as to their physical qualifications, and discussions of the work studied during the first part of the course. Lecturers on each phase of the work studied in the correspondence course supervise the discussions.

During the third phase of the work flying time is obtained, every student being required to fly at least one-half hour every three weeks. The equipment of the State Civil Department is used in the flying course which is supervised by Capt. Harry Generous, Deputy Commissioner of Aeronautics. Each student is assigned a problem to work out when making a flight for the purpose of demonstrating the connection between the work done in examining the applicant and the problems met while in the air.

In addition to this work, students are required to spend a resident period at the School of Aviation Medicine, Brooks Field, San Antonio, Texas. The Department of Aeronautics will also send students to civilian schools of aeronautics where they will have the opportunity of observing commercial training and comparing it with observations of military training made while attending the school of aviation medicine at Brooks Field.

William B. Smith, M. D., is Chief Flight Surgeon of the school of aviation medicine of the State of Connecticut. The advisory committee of the school includes the following: Lieut. Col. Luther H. Bauer, of the Department of Commerce; Maj. Francis H. Poole, of the Air Corps, commanding officer of the Army School of Aviation Medicine, Brooks Field, San Antonio, Texas; Lieut. Col. E. C. Schneider, Wesleyan University; and Capt. Harry W. Generous, Connecticut National Guard.

SOUND AIRWAYS, INC., operators of the New Bedford-Fairhaven airport, has announced plans for a transport service for passengers from New York to New Bedford, with a special branch to Cape Cod airports. Final plans are awaiting adequate airport developments.

PENNSYLVANIA

[B. F. PRYOR]

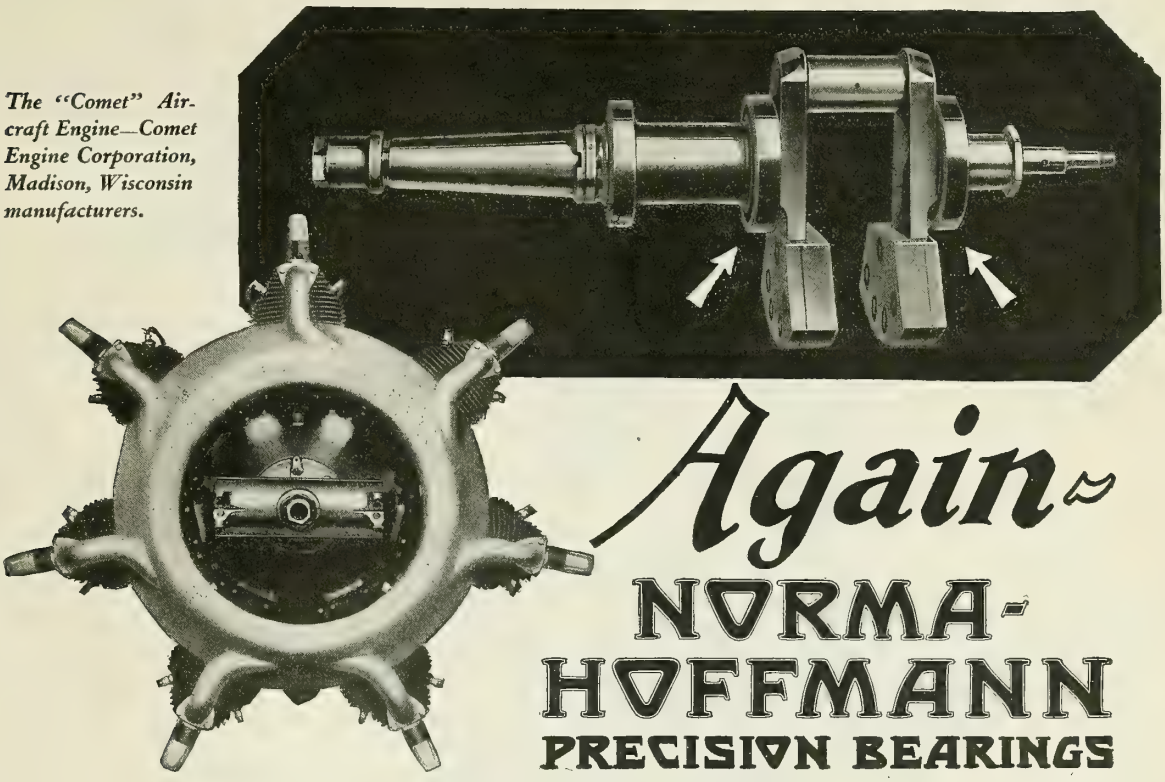
THE campaign to raise a quarter of a million dollars through the sale of stock of the Scranton Airport Corporation proved highly successful and the amount was oversubscribed by several thousand dollars. The campaign was held April 7-14. The sum will be used to build an airport at Schultzville, six and one-half miles from the central part of the city. The site was selected by the Austin Company of Cleveland, and is 180 acres in extent. There will be three runways, each over 2,700 feet in length. The Austin Company has prepared the plans for runways, hangars, shops, and an administration building. Construction work was to begin the latter part of May. William F. Hallstead is president of the Airport Corporation; Robert McClave vice president, and Henry Belin secretary-treasurer.

Penn School of Aviation at the Pittsburgh-Butler Airport

AN Approved School Certificate to give ground and flying instruction leading to private, limited commercial and transport pilots' licenses was granted to the Penn School of Aviation on December 12, 1929, by the Department of Commerce. The approval was granted following an inspection of the school's equipment, organization and instructors by inspectors of the department.

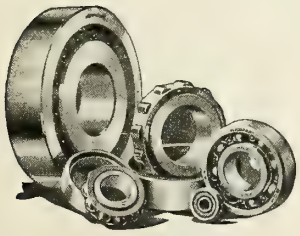
The Penn School of Aviation is located at the Pittsburgh-Butler Airport twenty-two miles north of Pittsburgh and seven miles south of Butler, Pa. The field is 226 acres in extent and is equipped for night flying with a revolving beacon, boundary and floodlights. There is a ceiling projector and the buildings are floodlighted. There are two brick and steel hangars eighty feet by 160 feet equipped with facilities for making repairs. Quarters for students are main-

(Continued on next page)



The "Comet" Aircraft Engine—Comet Engine Corporation, Madison, Wisconsin manufacturers.

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N-1046

NORMA-HOFFMANN BEARINGS CORPORATION STAMFORD, CONN., U.S.A.

(*Pennsylvania News continued*)

rant facilities are available. The students have complete use of the field and the repair shop.

The Penn school conducts a basic aviation ground school course in conjunction with the University of Pittsburgh. These classes are under the supervision of Lieut. Byron A. Glover, formerly of the Army Air Corps, who recently completed a text which is used in conducting the course. Seventy students have completed the basic aviation ground course.

The Penn School of Aviation also conducts an aviation business class in conjunction with the University of Pittsburgh. This course was inaugurated with fourteen students on February 3. Classes are held in the downtown division of the University of Pittsburgh in the Chamber of Commerce building.

The Penn School of Aviation is a subsidiary of the Pittsburgh Aviation Industries Corporation of Pittsburgh, Pa.

FOUR Philadelphia airports have been issued commercial licenses by the Pennsylvania State Aeronautics Commission, and a fifth has been granted a private license. This was done in accordance with the State Aeronautics Act, which requires flying fields in Pennsylvania to meet with state requirements. The four Philadelphia fields to receive the commercial licenses were the Philadelphia Airport, Pitcairn Field, Patco Field, and the William Penn Airport. The field securing a private license was that of the Keystone Aircraft Corporation at Bristol, Pa.

ANNOUNCEMENT of a $1,000,000 aviation development adjacent to Zelienople, in Beaver and Butler Counties, Pa., has been made by Carl Forcier, former assistant to the president of the Pittsburgh Aviation Industries Corporation.

The development will include two airport sites, an aviation country club site with a 36-hole golf course and a summer colony along seven miles of water front on Connoquenessing Creek. Flying activities, according to Forcier, will begin this summer. Development of the summer colony will get under way this spring.

PHILADELPHIA

PRODUCTION of ribs for airplane wings has been started by the Edward G. Budd Manufacturing Company of Philadelphia, Pa., and Detroit, Mich. The ribs are made of stainless steel and are electrically welded in accordance with a design developed by the Budd company.

[R. GARD]

EASTERN AIR TRANSPORT, INC., operators of the New York-Atlanta contract air mail route, inaugurated on April 1 a change in the mail plane schedule which gives Philadelphia a service of six planes a day. New York, Baltimore and Washington also benefit by the change. The change will place all Florida points overnight from New York.

THE Petz Aviation School, a subsidiary of the Petz Motor Company, recently became affiliated with the Flying Dutchman Air Service. The school will use Somerton Airport as a base for flight instruction. A Bellanca monoplane was recently added to the equipment of the school.

TWO gliders were exhibited at the Tri-State Aircraft Show, held during the week of April 18 to 26 at Camden, N. J. One was the McCusker Imperial, the first glider to be produced by the McCusker Imperial Aircraft Company, located in Camden, and the other a Waco primary training type put on exhibition by Wings Corporation, Waco distributors in Philadelphia territory.

Twenty-four airplanes of various types were placed on exhibition at the show. The planes taxied under their own power from Central Airport along the boulevard to the Convention Hall at the inauguration of the show. Many celebrated pilots were present during the course of the exhibition.

THE glider movement received new impetus recently in the Philadelphia area when one of the first modern motorless craft took to the air from Patco Field, located just outside the city. Wes Smith, president of the Philadelphia Air Transport Company, operator of the field, was the first to fly a modern glider in the vicinity of Philadelphia. Numerous other flights of short duration were made by other pilots at the field.

Soon after the first flights had been made, John R. Kane, of Glenside, made the first trial flights in a glider made by himself. In the test hops, Kane succeeded in reaching an altitude of fifty feet, making distances varying from between 300 and 400 feet. The Wings Corporation, which holds the distributorship for Waco planes in this section, was brought actively into this new movement by the decision of the Waco company to manufacture a glider of its own design. The Waco glider, of the primary type, has a lifting surface of 184 square feet. It takes off at twenty-five miles per hour, and lands at twenty.

A Tri-State Council, which will assist in directing the activities of glider groups in Eastern Pennsylvania, Southern New Jersey, and the State of Delaware, will hold its first meeting early in May. Among those named to the council are C. T. Ludington, Harold F. Pitcairn, Guiseppe M. Bellanca, Edgar N. Gott, Dr. Carl Fromm, Sanger Green, J. P. Jones, Jack Thropp, and Chester C. Charles.

Fifteen Gliding clubs, scattered through the tri-state area, will at present come under the supervision of the council. Ten groups of gliding enthusiasts have been formed under the guidance of the Philadelphia Glider Club. Members of the Aero Engineers' and Draftsmen's Association, which met recently in Philadelphia, have decided to join the glider movement. Competitive designs are to be submitted and a glider will be constructed from the winning plans. One of the latest clubs to be organized in the interests of gliding recently held its first meeting. The Delaware County Glider Club, as the organization is named, has begun construction of its first glider.

PITTSBURGH

[BOB COATES]

MAJOR RAYCROFT WALSH has been named head of sales of the Hamilton Standard Propeller Corporation at Pittsburgh. Maj. Walsh took up his new duties April 1.

WILLIAM J. AUSTIN has been elected vice president of the Pittsburgh Aviation Industries Corporation and will have charge of all sales activities of the company's numerous subsidiaries.

THE Pittsburgh Glider Club has purchased a motorless craft from the Baker-McMillen Company of Akron, O., and is holding weekly meetings in Schenley Oval. Three other clubs are being organized in the Pittsburgh district—at Washington, Overbrook and Lovedale, Pa.

JACK MORRIS, of the Morris Flying Service, has taken the distributorship in Western Pennsylvania for Aeronca light planes. D. Parr Peat, of the Mid-City Airport Corporation, is regional dealer for the ship.

HAL BAZLEY, Curtiss-Wright Flying Service, has been named manager of Bettis Airport, succeeding Jack Donahey, who was transferred to Valley Stream, L. I. He is assisted by L. R. Byler, head of sales for the Curtiss-Wright organization in the Pittsburgh district.

MARYLAND

[E. W. WALSH]

OFFICIALS of the Berliner-Joyce Aircraft Corporation, of Baltimore, Md., have completed tests of the attack plane which the company will build for the Navy Department, and of the wings of the pursuit plane under construction for the Army Air Corps. The tests on the attack plane were conducted at the Baltimore plant under the supervision of officials of the Navy, and the wings were tested to destruction by officials of the Air Corps at Wright Field, Dayton, Ohio.

The tests of the Navy plane were made under conditions simulating severe flight conditions tending to shear and twist the front end of the fuselage. The engine mount failed under a load of 19,000 pounds applied at the center of gravity of the engine group, proving a safety margin of fifty per cent.

(*Continued on next page*)

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National Tube Company, long experienced in the manufacture of tubing for rigid requirements, fully appreciates the importance of safety in aircraft construction and the need of highly dependable products. Both designers and builders may rightfully expect that this long experience, plus the expert knowledge, skillful methods and selected raw materials used in manufacture, enable this Company to furnish a line of tubing peculiarly fitted to aircraft construction.

Every foot of NATIONAL-SHELBY Aircraft Tubing must pass through an intensive system of testing and inspection. Tests for both chemical and physical properties are made to conform to United States Army Specifications. NATIONAL-SHELBY Aircraft Tubing is carried in stock by distributors located at convenient points throughout the country. Descriptive literature sent upon request.

NATIONAL TUBE COMPANY

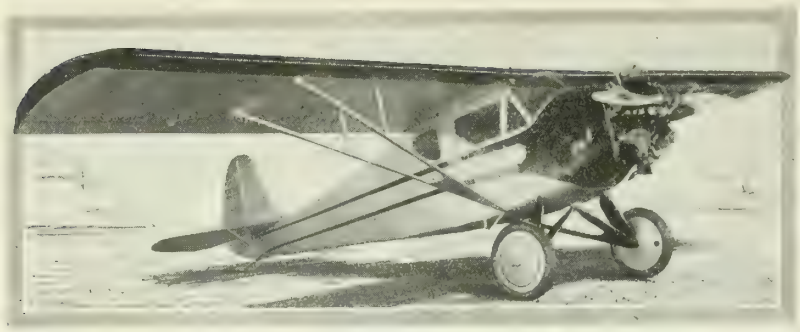
Frick Building, Pittsburgh, Pa.

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Pacific Coast Distributors–United States Steel Products Co., Columbia Department: San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*–United States Steel Products Co., New York City



The most recent model of the Monocoupe developed by the Mono Aircraft Company

(Maryland News continued)

The wings for the pursuit plane were first tested under inverted flight conditions to four times the normal load without failing. The wings were then tested under conditions simulating rolling flight without failure. A low incidence test was then made to determine the strength of the wings under high speed. The normal load was increased to six and one-half times without failure. To see how the wings would stand up should part of the bracing be shot away, one of the brace wires was removed and the wing was tested to full load requirements without failure. A test in an unsymmetrical attitude was then made. The wings broke under a high incidence test after the load had been increased to thirteen and one-half times the normal load. The tail surfaces were tested and the horizontal and vertical surfaces withstood over fifty per cent of the designed load.

THERE are now three glider organizations in Baltimore. The most recent club to be organized is the Maryland Glider Club, affiliated with the National Glider Association. The Glider Club of Baltimore was the first glider club organized in Baltimore, and the first in the state of Maryland. The Green Spring Valley Airport will be the flying headquarters of the club. The second club formed was the Maryland State Glider Club. A total of approximately sixty-five members have joined the three glider clubs. Gliders are being purchased by the three organizations and as soon as these are delivered instructions in glider flying will be given the members by qualified instructors.

KENTUCKY

[A. W. WILLIAMS]

ANNOUNCEMENT was recently made that Bowman Field, Louisville, will hereafter have hourly weather report service, according to George C. Andrus of the Cleveland airport who stated that the field would be connected by leased wire with Cleveland and St. Louis, and that teletype machines would be installed. Nine cities will be served by the line, including Cincinnati and Indianapolis. The Weather Bureau asks office space and room to install its instruments on the roof of the administration building at the field. J. L. Kendall, meterologist of the Louisville weather office, will supervise the field office.

ALL aviation bills before the Kentucky Legislature at the session ending in March were passed. One of these provided for authority to be given second class cities to establish municipal flying fields. Another provides for construction of roadways by the state from highways into municipal airports. Another creates the State Airboard, which will have full authority in the matter of issuing licenses, and providing regulations for fliers, and for operating flying fields, the license regulations being patterned after the Department of Commerce regulations.

THE Louisville and Jefferson County Airboard, administering affairs at Bowman Field, the municipal airport, has announced lease of the Caperton Farm, of 164 acres, on the Ashbottom Road, just South of Louisville, where an auxiliary field is to be installed for use of students and all practice work. This action will give a clearer field for Army, commercial, mail and other services at Bowman Field, and will also reduce danger of accidents by cutting down congestion.

W. S. PARK, Louisville, has recently assumed his duties as president of Aero Club of Kentucky, to succeed L. S. Vance. Norton Goldsmith is vice-president, and John Russ, secretary-treasurer, of the club.

OHIO

WACO Aircraft Company of Troy, Ohio, has secured an Approved Type Certificate for the Waco plane powered with the Warner engine. The production schedule of the Waco company will be increased and will include the manufacture of Waco planes powered with the Warner engine.

A DEPARTMENT which will study the problems of rolling airport surfaces has been established by the Buffalo-Springfield Roller Company of Springfield, Ohio, makers of rollers. The department will collect data on the effect of climate, nature of soil, drainage and character of traffic on a field, and in the choice of the size and type of roller to be used on an airport.

OSCAR W. LOEW has been appointed a vice-president of the Truscon Steel Company of Youngstown, O. Mr. Loew was formerly director of advertising and sales promotion of the Truscon company.

COLUMBUS

[W. DONALD WALTER]

MECHANICS at Norton Field have completed the work of painting the recently authorized Norton Field insignia on the fuselages of the ships assigned to that station. The insignia consists of a solid white map of the state of Ohio, with the location of Columbus and Norton Field designated in red. The map is set in a blue circle, outlined in white, and the entire design presents a very neat and attractive appearance.

THE first glider flights in Columbus were made on Sunday afternoon, April 6th, at the Columbus Airport on Sullivan Avenue. A rather stiff breeze lent interest to the hops, which were made in an all-metal glider owned by the Columbus Glider Club. The interest shown in gliding was most encouraging, and from all appearances glider flying will quickly become a popular sport in this city.

AN office has been established at Port Columbus by the United States Weather Bureau. Communication will be maintained by teletype with twenty or more similar stations over the country. This office should prove of decided value to pilots operating out of Port Columbus.

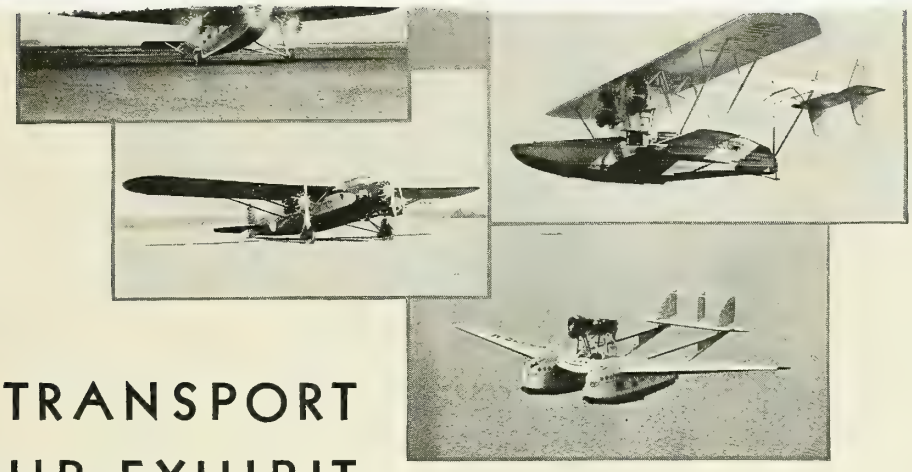
PORT COLUMBUS is now served by a bus line, operated by Airport Bus Lines, Inc. Busses run each hour, leaving Broad and Third Streets, in the heart of the city, on the half-hour from 5:30 a. m. to 8:30 p. m.

AN O-11 has replaced the O-2 formerly assigned to Major Muehlenberg, Corps Area Air Officer, at Norton Field. It was flown in from Middletown Air Depot by Lieutenant McConnell. Another is expected soon for the use of the Reserve Corps, and the C. O. will have his hands full checking the boys out on it. There is also a possibility that we will get one or more of the new Thomas-Morse O-19 all-metal jobs, Wasp-powered.

CLEVELAND

APPOINTMENT of William Ganson Rose as manager of the International Gordon Bennett Balloon Race and its attendant attractions at Cleveland, Ohio, on August 30, 31 and September 1, has been announced by L. W. Greve, president of the National Air Races, Inc., which is sponsoring the event. The general program for the show was made public by Mr. Rose shortly after his appointment. He spoke at a meeting of the Cleveland Glider Association, declaring that motorless flight contests and demonstrations, with the cooperation of nationally-known pilots, will be a highlight of the program.

(Continued on next page)



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Uniform in quality—perfect in workmanship—precise in performance—Pioneer Instruments have long been linked with the progress of aviation. Where the safety of a ship depends upon Pioneer Instruments, it is safe—whether it is a luxurious air transport, a swift mail plane, or a sport model.

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(Ohio News continued)

A RECENT supper of the Cleveland Glider Association marked the opening of spring activities by its five affiliated clubs and brought out an attendance of nearly 200 enthusiasts. The speakers included L. W. Greve, Floyd J. Logan, Lady Mary Heath, Mrs. Blanche W. Noyes, Dr. Wolfgang Klemperer, Donald F. Walker, "Jack" Berry and William Ganson Rose, recently named manager of the International Gordon Bennett balloon race. L. F. Ross, president of the association, presided.

WITH fares unchanged, the new spring schedule of the Stout Air Lines, between Cleveland, Detroit and Chicago, has been announced by John Halpin, Cleveland manager. There are now two daily trips between Cleveland and Chicago and four between Cleveland and Detroit. The through planes leave at 10:30 a. m. and 4 p. m.

By riding the Stout Line to Chicago and the Santa Fe as far as Kansas City and exchanging to the Western Air Express line, a passenger can reach Los Angeles from Cleveland in twenty-eight hours, Mr. Halpin stated. A new feature of the service is a double section Friday and Saturday to accommodate the large number of week-end passengers who are going to Detroit and Chicago.

INDIANA

GLENN W. POYZER has been appointed pilot and salesman in the eastern territory for the Davis Aircraft Corporation of Richmond, Ind. He was civilian flying instructor at Wright Field, Dayton, Ohio, during the World War, and is a former sales manager of the Buffalo Fire Appliance Corporation of Buffalo, N. Y.

The Davis corporation recently appointed the Warrington Motor Car Company of Washington, D. C., distributor of Davis planes in the District of Columbia, Maryland, Virginia, and North Carolina. The Airplane Sales Corporation of Joliet, Ill., was recently appointed distributor for the State of Illinois by the Davis company, and has ordered two Davis planes. A contract to distribute Davis aircraft in Central New York was recently signed by the Hayes Aviation, Inc., of Syracuse, N. Y., and the Davis Aircraft Corporation.

DAVIS AIRCRAFT CORPORATION of Richmond, Ind., has placed in production a new Davis D-1 monoplane, powered with the LeBlond 85-horsepower model 66 engine. This plane has a high speed of 115 miles per hour, landing speed of thirty-eight miles per hour, a service ceiling of 12,000 feet, and a cruising speed of ninety-five miles per hour.

ENGINEERING students of Purdue University will receive instruction in flying and aeronautical engineering, as a result of a coöperative arrangement recently effected between Purdue, Lafayette, and Indiana universities and the Curtiss-Wright Flying Service, Inc., Indianapolis, Ind. The flying courses will be given at the Indianapolis branch of the Curtiss-Wright Flying Service, beginning June 18th, and will be continued until August 19th.

Courses in aerodynamics, theory of flight, airplane structures, navigation and aerostatics will be given at Purdue University under the supervision of George W. Haskins, Professor of Aeronautical Engineering, School of Mechanical Engineering. Engineering students of any college or university will be accepted for these courses, if they have completed the equivalent of the three years in engineering at Purdue University. All students who have completed the flying instruction will be given an opportunity to take the examination for pilot's licenses given by the Department of Commerce.

MICHIGAN

PRODUCTION of ten aircraft engines per day is included in a program of expansion recently announced by officials of the Continental Aircraft Engine Company, subsidiary of the Continental Motors Corporation. The company has started the development of a service program which will make parts of the Continental A70 aircraft engine available throughout the country.

Ten aircraft manufacturers have installed the Continental A70 power plant in their planes and have started tests preliminary to application to the Department of Commerce for Approved Type Certificates on the planes powered with the Continental A70 engine.

THE first sale of an airplane powered with a Packard Diesel aircraft engine for commercial purposes was announced recently by officials of the Stinson Aircraft Corporation of Wayne, Mich. The Stinson company has started commercial production on a four-place cabin monoplane powered with the Packard Diesel engine. The engine is of the radial type developing 225-horsepower at 1,850 revolutions per minute.

REDUCTIONS of selling prices of all Ford trimotor planes manufactured by the Ford Motor Company of Dearborn, Mich., were announced recently by Edsel Ford, president of the company. The cost of the Ford Model 5-AT, powered with three Wasp engines, has been reduced from $55,000 to $50,000. The prices of Model 4-AT, powered with Wright J-6 engines, Model 9-AT with Wasp Junior engines, and Model 11-AT equipped with Packard Diesel engines, has been reduced from $42,000 to $40,000. The price of Model 7-AT was reduced from $51,000 to $47,000.

W. E. SCHAEFER has been appointed chief engineer of the Detroit Aeronautic Products Company of Detroit and New York City, according to a recent announcement of officials of the company. Mr. Schaefer was formerly affiliated with the Stout Metal Plane Company. The Detroit company manufactures aircraft bolts and screw machine products for the aeronautical industry.

A CONTRACT to supply exclusively all aircraft finishes used in the manufacture of planes by the subsidiary companies of the Detroit Aircraft Corporation was signed recently by Berry Brothers, Inc., of Detroit, Mich., and the Detroit corporation. Berry Brothers manufactures Berryloid aircraft finishes.

THE engineering department of the AC Spark Plug Company of Flint, Mich., has moved into its new engineering building. The space vacated by the department will be used for manufacturing activities, which were recently augmented by gasoline gauges and mica insulated spark plugs for aircraft. Total floor space of the company comprises 805,000 square feet, with the addition of the engineering building.

Removal into the new building will place

(Continued on next page).



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"When it comes to making new ships out of ones that have been on the road 'barnstorming' and tho not old with use, are slightly weather-beaten, your product is hard to beat," say the Southern Airways, Inc. And Mr. J. B. Lee, who is the progressive manager of the Augusta Airport, tells us he has Johnson-Waxed all his planes to protect fabric and finish from otherwise unavoidable deterioration.

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(Michigan News continued)

the development engineering activities of the company under one roof and will afford increased facilities for testing, research and development work. The new building, construction of which was started last fall, is three stories high, has 73,000 square feet of floor space and contains laboratories, drafting rooms, offices and designing rooms.

ELEVEN hundred and seventy-five hours at full speed, maximum power operation, have been completed by three Continental A70 aircraft engines in endurance tests conducted by the Continental Aircraft Engine Company, Detroit, Mich. The tests included a series of non-stop runs of twenty-five hours each. The three engines having completed thirty-five of these runs, it was decided to increase the severity of the test by making each run fifty hours without stopping.

EDWARD MACAULEY has been appointed sales manager of the aircraft and marine engine division of the Packard Motor Car Company and will be in charge of sales of the new Packard-Diesel aircraft engine. Announcement of the appointment was made by H. W. Peters, vice president of distribution of the Packard company.

AERONAUTICAL products now manufactured by the Aircraft Products Corporation of Detroit, Mich., includes skis, pontoons, gasoline tanks, oil cooler tanks, wheels—including the Skiwheel—brakes, tailwheel assemblies, retractable landing gears and shock absorbing struts, according to a recent announcement of officials of the company. The company recently acquired the tank division of the Holcker Manufacturing Company of Kansas City. Ralph R. Irwin is president of the Aircraft Products company.

[K. F. ZEISLER]

THE Michigan Municipal League is sponsoring a state conference on airports to be held at Traverse City June 12 and 13. Emphasis will be laid on the construction and improvement of Michigan airports, and an effort will be made to induce cities in the Michigan resort area to provide aviation facilities for summer tourists. Ben L. Taylor of Traverse City will be chairman and Wayne Sheldon, director of the Michigan Air Tour, will assist. Information on design and construction of modern landing fields will be furnished all delegates.

A TRANS-LAKE ERIE ferry service for Detroit and Cleveland, operating on a two-hour schedule throughout the entire year, is the plan of the Thompson Aeronautical Corporation. Service on the line, started last summer, was resumed April 28, with four Loening amphibions. During the six months the line was operated last year, 3,500 passengers were carried. Five 55-minute trips will be run daily, with reduced fares in effect.

SELFRIDGE FIELD, at Mt. Clemens, Mich., will lose two of its ranking officers this summer in the transfer of Colonel Charles H. Danforth, commanding officer, and Major Ralph Royce, to Washington, D. C. Col. Danforth succeeded Major Thomas Lanphier two years ago on the latter's resignation, and has been in charge of the field during the almost complete rehabilitation of the buildings and equipment.

Col. Danforth will be succeeded in June by Major George H. Brett. Maj. Brett is now stationed at the general staff school at Ft. Leavenworth, Kans. He is a graduate of the Air Corps Tactical School at Langley Field and served for several years as chief of the Air Corps field service section. He was stationed at the Handley-Page plant in England during the war. Capt. Robert S. Beard, field representative of the Quartermaster's Department at Selfridge for the last three years will return to Washington in June. He will be succeeded by Lieutenant Elsmere J. Walters.

Including eighteen of the new fast pursuit ships, forty-four planes, forty-seven pilots and twenty-two enlisted men under the command of Major Royce left Selfridge March 28 to participate in the annual Army exercises at Sacramento, Calif.

DETROIT

THE Detroit Aircraft Glider Club, organized by employees of the Detroit Aircraft Corporation, recently held its first field meeting at Grosse Ile Airport. Six members qualified for their junior licenses, issued by the National Gliders Association, keeping their craft in the air the required thirty seconds. They were B. Wilson, W. Morrow, Morris Wright, John Rhoda, James Eastman and George Hineman.

THE Lockheed Division of Detroit Aircraft recently received Approved Type Certificate No. 300 for the new low-wing Lockheed Sirius. Colonel Chas. A. Lindbergh conducted the Department of Commerce tests in the ship of this type that he purchased.

IOWA

[R. W. MOORHEAD]

DES MOINES authorized a $200,000 bond issue for the purchase, equipment and maintenance of a landing field at a city election recently held. Passage of the bond issue and defeat of a similar proposition in Cedar Rapids, Iowa, gives Des Moines a clear way to an effort to obtain both north and south and east and west transcontinental air routes.

At the same election a new city council went into office which is pledged to the appointment of a board of experts to select the best site for a new field. Argonne Post of the American Legion carried on an intensive campaign during the month preceding the election in an effort to put the bond issue over.

A FIFTY year lease of the Iowa City, Ia., air mail field to the Boeing Air Transport company has been approved by the city council of Iowa City. Under terms of the lease the city may terminate the contract at the end of any ten-year period. The field is to be improved to insure an A1A rating by an expenditure of approximately $50,000. Of this amount, $13,000 is to be paid by the city and the remainder by the company which will pay no other rental for the field.

UNITED AIR ACTIVITIES, INC., Newton, Iowa, has purchased the Bolte Aircraft corporation of Des Moines, purchasing all tools and equipment. New officers of the United Air Activities, Inc., are W. Allen Whitfield, president; J. H. Allen, vice president and Mae McLaughlin, secretary and treasurer.

THE Second Iowa Aeronautics Conference will be held at Iowa State College, Ames, Iowa, May 9 and 10. Ames Post No. 37, American Legion, will hold an air meet at its airport on May 10 and 11 in connection with the conference. The Aeronautics Conference will be under the direction of the engineering extension service and the aeronautical engineering section of the mechanical engineering department.

NEBRASKA

MOUNTING popular interest in aviation at Hastings, Nebr., has resulted in the organization of a glider club. Purchase of a glider will be made early this summer.

THE Lincoln Aircraft Corporation of Lincoln, Nebr., has contracted for fifty Kinner K-5 engines which will be used on two Lincoln models now being put into production. The Lincoln company is also working on a cabin job in which the new Kinner 190-horsepower engine will be installed.

ARROW Aircraft and Motors Corporation of Havelock, Nebr., announces a new model to be known as the Arrow "Tangerine." It is powered by the Lambert 90 horsepower engine and will be produced in only one color combination, deep orange with a blue stripe.

The initial Arrow "Tangerine" was test flown at Arrow Airport, Inc., and against an eighteen-mile head-wind it took off in fifty feet and climbed 1,300 feet in a minute from the take-off at a sixty-five degree angle. Top speed was 110 miles per hour and cruising speed 95 miles per hour. It weighs 860 pounds.

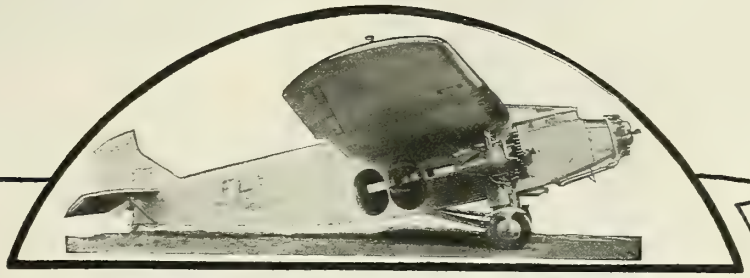
F. Pace Woods, Arrow sales manager, announces that Arrow planes will be available this year with Brownback and Warner-Scarab engines, as well as with the LeBlond power plant.

Territorial and regional representatives that have signed up so far this year to handle the Arrow line include Harry I. Day, New York; Paul Eidsmore, Seattle; Northwest Air Service, Inc., Seattle; Eckerson Flying Service, Inc., Medford, Ore.; G. G. Davidge, Pasadena, Calif; Parker B. Abbott, San Francisco; Edwards Motor Co., Lexington.

(Continued on next page)

UNIVERSAL FLYERS, Washington, D. C.

Establish New Record in FORD TRI-MOTOR with GULFPRIDE OIL 120



UNIVERSAL FLYERS
INCORPORATED
WASHINGTON, D.C.

Gulf Refining Company,
Pittsburgh, Penna.

Gentlemen:-

You will no doubt be interested in knowing something of the results that we have been obtaining through the use of GULFPRIDE OIL and GULF NO-NOX MOTOR FUEL in our Ford Tri-Motored All-Metal Monoplanes.

As you know, our planes have been used to make an educational tour, under the auspices of Ford Dealers, throughout the country. The first one of our ships was started out in September 1928, and in its first year, through the 15th of September 1929, made a world's record for plane and pilot, for the greatest number of passengers carried in any one airplane during a similar period; having carried more than 25,000 people, made over 4000 take-offs and landings, and having flown during that period approximately 70,000 miles. The most important feature of the accomplishment, we feel, is the fact that every flight was completed safely and never once was it necessary to make a forced landing.

We have just overhauled the motors now for the third time - the total number of actual flying hours being in excess of 900 - the cost of parts replaced at each overhaul was reasonably low, the parts used in this third overhaul totaling only $304.00 for all three motors.

Our Mr. Ray Loomis, formerly of the Ford Airport at Detroit, piloted this plane during the entire period and he, as well as ourselves, feel that this wonderful motor performance is due, in a great measure, to the constant use of GULFPRIDE OIL and GULF NO-NOX MOTOR FUEL.

A greater number of the fields that we operated from had untreated dirt runways and in dry weather our three motors blew up clouds of fine sand and dirt. This was particularly bad for us because of the great number of take-offs and landings that we made each day; our average flight being 15 minutes. In spite of this hard service, however, we found when the motors were torn down during each of the three overhauls, that there was a decided absence of the usual sludge; also that the bearings each time were in perfect condition and even at the third overhaul, did not show any appreciable signs of wear.

Airmindedly,
UNIVERSAL FLYERS
Incorporated
Leo J. Rocca

GULF

"GULFPRIDE OIL"
"America's Finest Aircraft Oil"
GULF REFINING COMPANY

Say you saw it in AERO DIGEST

(Nebraska News continued)

Ky.; North Shore Airways, Inc., Boston; Mrs. Theodore Kenyon, Boston; Saunders Fly-It-Yourself Co., Kansas City; Fergus Falls Air Service, Inc., Fergus Falls, Minn.; Nelson Story, 3rd, Bozeman, Mont.; Herington Airways, Herington, Kas.; Churchill Humphrey; Louisville, Ky.; Miss Olivia Mathews, Long Island Aviation Country Club, N. Y.; L. E. Regan, Tecumseh, Okla.; Mutual Aircraft Corp., Santa Monica, Calif.; and C. Ed Line, San Diego, Calif.

[J. R. Lowell]

BOEING AIR TRANSPORT, INC., filed a petition in the district court at Lincoln for an injunction against Nebraska officials to prevent them from attempting to collect the state's 4-cent tax on gasoline brought from Oklahoma to Nebraska and used by the air transport company in interstate commerce. It is claimed that the company uses around 250,000 gallons of gasoline a year, and that the tax, if the state is permitted to charge on the gasoline used in the planes running between Chicago and San Francisco, will amount to $10,000 a year. No exemption is asked for fuel used in the company's trucks or local traffic planes.

The tax asked by the state for the month of February, on 21,056 gallons, amounting to $842, is made the basis of the present suit. It is alleged that the state is interfering with interstate commerce in attempting to collect a tax on the gasoline used in interstate business. It is set out in the petition that the Boeing company buys its supply of gasoline from the Phillips Petroleum Company at Tulsa, Okla., on contract, and has it shipped in tank cars to the airports at Fort Crook and North Platte, Neb., and stored there for refueling its planes on the transcontinental trips.

THE Arrow Aircraft and Motors Corporation at Havelock has formed a pay-as-you-fly school, called the Rainbow Division of the Flying Fifty Arrow Club, which operates at Arrow Airport. Flying instruction is offered at $13 per hour for dual training and $10 per hour for solo time. A fee of $50 is exacted from the student upon enrollment in the club, giving him permanent membership privileges; or he will be allowed to fly out the amount at $10 per hour after he has completed the twenty hours necessary for the private license course.

The entire equipment of the Arrow Flying School, including instructors, parachutes, new and approved planes, and ground school equipment is at the disposal of the new club. The student may receive instruction at any hour of the day, including Sunday for solo time, the agreement being made, however, that the twenty-hour course will be completed within six months after time of enrollment.

The Arrow company has inaugurated a free instruction policy to apply to all purchasers of Arrow Sport planes during the present season, instruction to include a private license course. All Arrow representatives have also adopted the same policy.

THE city council of Fairbury, Nebr., has passed an ordinance to submit the question of financing an airport to voters of Fairbury at a special election on June 3. The election will be on the question of issuing $30,000 in bonds, about two-thirds of this to be used in purchasing a quarter of a section of land for the airport at $120 per acre.

BIDS have been awarded by the Lincoln city council to construct an $850 water main, a $1,200 pump house, and to install a pneumatic water supply system costing $2,500, at the Lincoln Municipal Airport. As soon as the main is completed and the system in operation, the different buildings on the field will be connected with the sanitary sewer system which has already been built.

THE Boeing Company has taken a ten-year lease on the North Platte Municipal Airport, with an option to renew the lease until a period of fifty years has elapsed. The company will have the use of the field for landing, the privilege of building its own hangars and passenger depot, and the sale of gas to itinerate fliers, with a rental charge of $1,500 to be paid the city annually. A broadcasting station for exclusive use of Boeing planes is being erected and is expected to be in use by June 1.

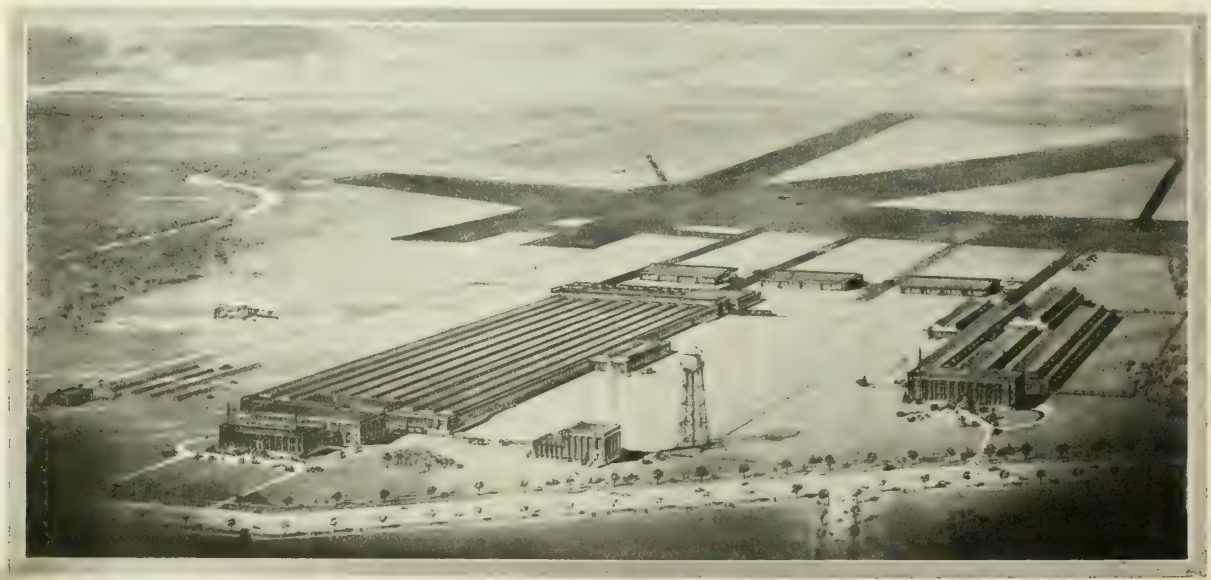
RAPID AIR TRANSPORT, INC., opened an air passenger and express service between Omaha and Kansas City April 1, which, according to Walter R. Halley, president of the company, is to be the first division of a network that will extend in all directions from Omaha this year. Chicago, Denver and Minneapolis are considered as terminal points in the plan.

KANSAS

A NEW parasol type monoplane, designed by Claude C. Lear and built by the Junior Aircraft Club of Anthony, Kan., will be ready for test flights in the near future. Built to accommodate a motor of 100 horsepower or less, the new plane is a two-place sport job. Ray Fox is president of the Junior club. Members of the organization are: L. E. Hammens, Russell Rishell, Dean Hughs, Dale Hughs, Virgil Fenton, Marshall Coon, Mel Keeble, Arthur Seth, Wendell Palin, Delman Palin, Carl Hughbanks and Howard H. Parsons.

YELLOW AIR CAB company of Wichita has received the first Yellow Air Cab manufactured for it by the Stinson Aircraft Corporation of Detroit. The plane, built especially for cab service, is a four-place cabin monoplane, powered with

(Continued on next page)



Proposed layout of the United Airport, East Hartford, Conn., adjacent to the plants of the Pratt and Whitney Aircraft Company and the Chance Vought Corporation. This latter company recently moved into its Connecticut plant

"Ready Made"



EVERY aeroplane manufacturing plant and maintenance department should have one or more of Bunting's stock lists of 450 sizes of "Ready Made" Bunting Quality Phosphor Bronze Bushing Bearings.

These bearings are completely machined and finished, ready for assembly. Large stocks are constantly carried at the factory and all Bunting branch warehouses. They are instantly available. The range of sizes covers numerous usual production and maintenance requirements. The price is low even in small lots. We will gladly send you one or more of these bearing stock lists.

These "Ready Made" bearings make easily and economically accessible a highest quality sandcast phosphor bronze bushing bearing for the frequent conventional applications, supplementing Bunting's outstanding service to manufacturers whose requirements demand specially designed bearings made of alloys selected for unusual and individual needs.

Here is a great fund of proved specialized knowledge about bearings and bearing applications in the aviation industry. It costs you nothing; it may save you much.

THE BUNTING BRASS & BRONZE CO.
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One or more of these stock lists showing 450 sizes of "Ready Made" bearings will be sent on request. Write for it.

BUNTING
QUALITY
PHOSPHOR BRONZE
BUSHING BEARINGS
PATENTED

(Kansas News continued)

a 225-horsepower Wright Whirlwind.

Several similar planes will be purchased soon, according to G. E. Prebenson, president of the Yellow Air-Cab Company.

CESSNA AIRCRAFT COMPANY has actively entered the glider field with a craft designed by Eldon Cessna, son of Clyde V. Cessna, president of the company. The company is aiding in the formation of glider clubs in Kansas and Oklahoma.

One glider has been sold to the Norwich, Kan., Glider club, and another to an Oklahoma organization being formed. Newton, Kan., is also organizing a glider club, assisted by Frank A. Dobbe, of the Cessna company.

THE "400 Flying Club," sponsored by the Yellow Air-Cab Company of Wichita, Kansas, has been organized to give sufficient flying time to permit business men and others interested to handle their own planes. Ten hours' dual instruction, or fifteen hours' solo time, is covered by membership in the club. If a member does not care to take the allotted flying time, 1,500 miles transportation in taxi planes may be had instead.

[W. PRYOR]

ORGANIZATION of the Early Bird Glider School at Wichita, Kan., has been announced by Charles Erie Quick. The school is located at the old Cessna factory field in Wichita, and Cessna primary gliders are used.

WILLIAM P. SULLIVAN, founder, was recently re-elected president of Sullivan Aircraft Company. A. F. Real was named vice-president; Kenneth K. Cox, treasurer; and Lyan Coates, secretary. Members of the board are: W. E. Hammond, G. G. Wassom, Orre Waggoner and Earl A. Nossman.

MISSOURI

CONSOLIDATION of the Kansas City Aircraft Company of Kansas City and the Bird Wing Commercial Aircraft Company of St. Joseph, Mo., involving approximately $500,000, has been announced jointly by G. L. Chadborn, chairman of the Kansas City company, and Carl Wolfley, vice-president and general manager of the Bird Wing Aircraft Company. The consolidated corporation will be known as the Bird Wing Company.

Manufacturing operations of the consolidated companies will be continued at Kansas City and St. Joseph. It is planned to combine the two plants eventually, but it has not been decided whether the consolidated factory will be located at Kansas City or St. Joseph. The Kansas City Aircraft Company manufactures the Sky Lark monoplane, and controls the Mid-American Flying Service, a subsidiary company operating flying schools and engaging in aircraft sales for the Bird company.

THE Department of Commerce has awarded Approved Type Certificate 302 for the four-place folding-wing cabin monoplane powered with a Continental A70 engine manufactured by the American Eagle Aircraft Corporation of Kansas City, Mo. The Continental A70 is produced by the Continental Motors Corporation under Approved Type Certificate 32, developing 165 horsepower at 2,000 revolutions per minute.

KANSAS CITY

[R. M. BURTT]

THE American Eagle Aircraft Corporation of Kansas City recently completed arrangements for the setting up of a branch assembly plant at San Luis Potosi, Mexico. E. E. Porterfield, president of the American Eagle company, said in making this announcement, that Col. Antonio Sea, an engineer, had purchased one American Eagle biplane which was to be shipped to San Luis Potosi and assembled there.

LIEUTENANT I. Davies, of the United States Army stationed at Kansas City Airport, has been transferred to the Tactical School at Langley Field, Norfolk, West Virginia, to report by September 1. Captain Wright, of Kelley Field, San Antonio, Texas, will take command at Kansas City.

THE Rapid Air Transport, Inc., has recently inaugurated a daily passenger service between Kansas City and Omaha, the flying time being one hour and forty-five minutes. One plane each way will be flown daily.

JOHN L. SEAWELL, Yakima, Washington, recently signed a contract with the Inland Aviation Company, taking over the distribution of Inland planes for Northern Oregon and that part of the state of Washington west of the Cascade Mountains. Mr. Seawell is operating schools at Pendleton, Oregon, and Yakima and Walla Walla, Washington.

PLANS for a special racing job to compete in the All-American flying derby for Cirrus motored ships have been completed by the Inland Aviation Company of Kansas City. This derby will start from Detroit July 21 and fly to Montreal, New York City, Mexico City, Los Angeles, and back to Detroit by August 1. The derby prizes total $25,000.

[H. H. JAMES]

MARCH saw the first anniversary of Kansas City's air passenger service, and brought home to the public the rapid growth of the industry. A year ago the first scheduled air passenger service opened here with the inauguration of the Southwest Air Fast Express schedules to the Southwest. This was followed soon by other lines and before the year closed Kansas City was the key point in two trans-continental lines, and five air passenger organizations now are operating seven passenger lines out of the city. A year ago the planes carried only an occasional passenger. In February this year the lines operating from Kansas City handled 1,793 passengers at the city's airports. The through passengers are not counted in this figure. The two through lines, the T. A. T.-Maddux and Universal, handled 1,176 of the total.

THE Consolidated Air College, operating at Richards Field, Kansas City, has announced a reduction in tuition rates, according to M. B. Salisbury, sales manager. The former charge of $25 an hour for dual instruction has been lowered to $15; the $20 charge for solo time for pilots has been dropped to $13, in the private pilot class, while that in the limited commercial pilot class the rate has been cut from $18 an hour to $11.50. The school is the distributor for several lines of aircraft including those of the Mono Aircraft Corporation, Ryan Aircraft Company, Swallow Airplane Company and the Great Lakes Corporation.

THE Curtiss-Wright Flying Service recently completed its first year of operation at Fairfax Airport, Kansas City. In this time the company has expended approximately $250,000 in developing its base, according to Everett M. Oxley, sales manager. Besides its school, the company has departments of aerial photography, air taxi service, the sale of ships and the distribution of parts and equipment for planes.

ST. LOUIS

APPOINTMENT of Paul M. Hewitt as regional sales promotion manager for the Parks Air College Division of the Detroit Aircraft Corporation was announced recently by Oliver L. Parks, vice-president and general manager of the flying school. Mr. Hewitt will have charge of the eastern district of the United States with headquarters in New York.

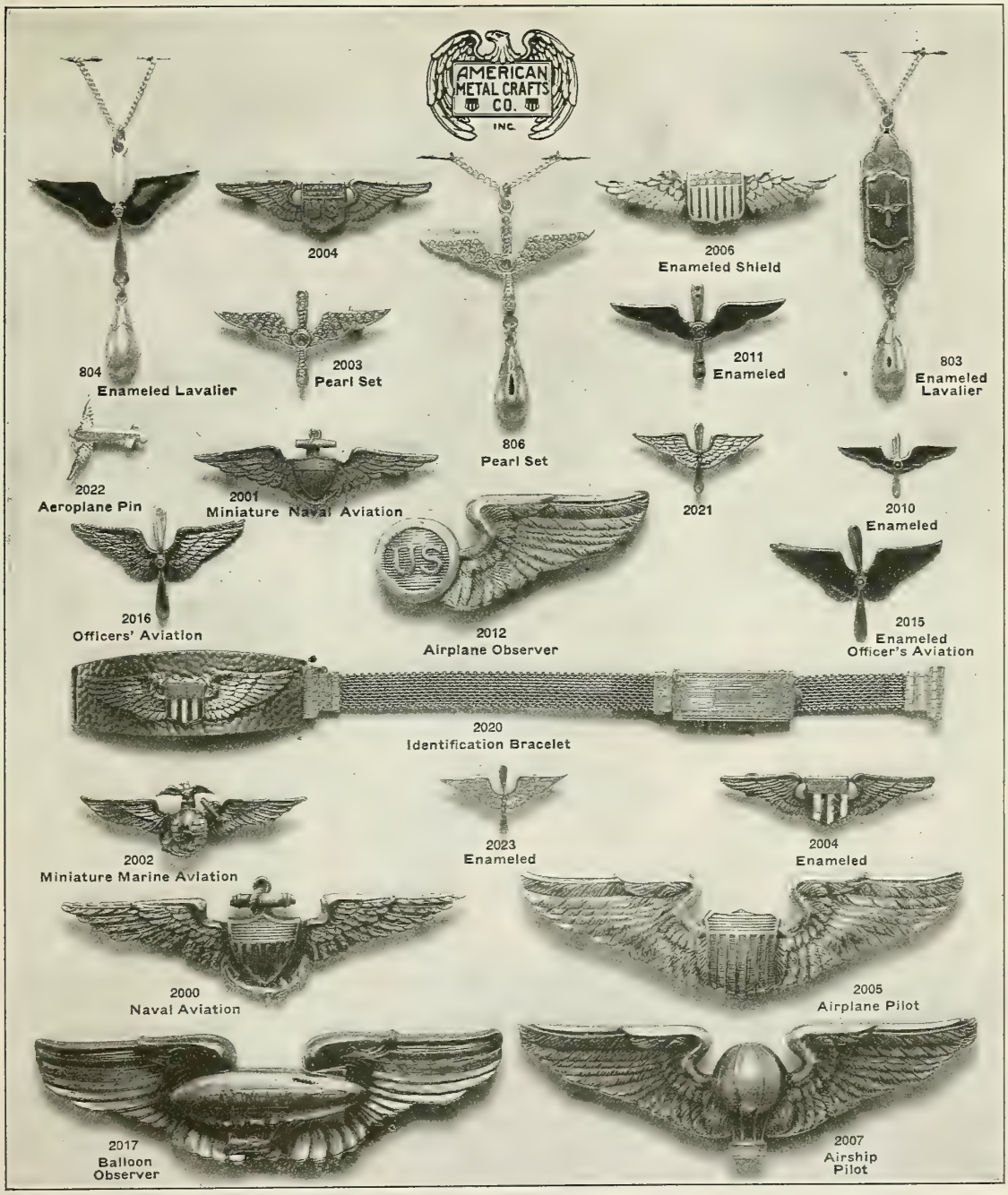
[A. W. LEAGUE]

THE second night air mail run out of St. Louis was inaugurated on April 2nd by the Interstate Division of American Airways, Incorporated. The first plane over the new run carried 150 pounds of mail and was piloted by John S. Pricer. The present schedule calls for a plane to leave St. Louis at 10:50 p. m. for the flight to Evansville, Indiana, where connections are made at 12:30 a. m. with a plane bound for Atlanta, Georgia, from Chicago. Connections are made at Atlanta for points in Alabama, Georgia, Florida and Cuba as well as points in Central and South America. A saving of twelve hours for mail directed to Cuba, Central and South America is brought about by this new service. The return plane from Evansville to St. Louis is scheduled to leave Evansville at 4:35 a. m. arriving at the St. Louis Municipal Airport at 6:15 a. m. in time for the first morning delivery in the city.

AN increase of 450 per cent in the volume of traffic in the first eight weeks of 1930 has been reported by officials of Transcontinental Air Transport - Maddux Airlines. During these eight weeks 6,793 passengers were carried as compared with an average of 600 a month under the old passenger fare rate. The heaviest travel reported was between Columbus, Ohio, and

(Continued on next page)

Attention!! Airports, Transport Companies and Aviation Enthusiasts



Spring is here and with it comes the opportunity for Sales and Profits.

We manufacture a complete line of Novelty Jewelry, mounted with Aviation Insignia as well as Insignia alone. We will also furnish, according to your specifications, any design for Identification, Gift or Souvenir purposes that you may submit.

Write for illustrated folder containing a large variety of items we manufacture.

AMERICAN METAL CRAFTS COMPANY

ATTLEBORO, MASS.

Manufacturers of

AVIATION INSIGNIA AND NOVELTIES

Metal Military Ornaments for the United States Army, Shooting Medals, Athletic Medals, Regimental Insignia, R. O. T. C. Metal Ornaments, Novelties mounted with Aviation and Military Insignia, Special Order Work

Say you saw it in AERO DIGEST

(Missouri News continued)

Wichita, Kansas. The planes were operated 347,548 miles during the eight weeks' period. Additional service between St. Louis and Columbus and St. Louis and Wichita, established first as experiments, has been patronized to such a large extent that it now has been made a part of the regular schedule.

AN aerial map of St. Louis, showing all streets, public buildings and places of interest, is to be made by Wings Photo Service of St. Louis. Phil Silverson, manager of the company, says the map will comprise 250 photographs and will be about ten feet square when completed.

CAPT. WM. E. KEPNER, balloonist and dirigible pilot at Scott Field, has been instructed to report to March Field, California, in May to begin instruction in piloting airplanes. Three other Scott Field officers, Lieuts. Engles, Selway and Holmes, are now at March Field taking primary training.

DUE to the large number of students in the mechanical department of the Von Hoffmann Aircraft Flying School, an additional instructor, Wade Epperson, formerly employed as mechanic for the Thirty-fifth Division Air Service, has been engaged.

Two Lincoln-Page Trainers have been added to the flying equipment of the school. The planes were flown to the school by Ted Hauter, vice president of the Von Hoffmann Flying School and William Brewster, chief instructor.

William Dings, formerly with the Universal Aviation Corporation, has resigned as a registrar of the Universal Flying Schools to accept a similar position with the Von Hoffmann organization.

THE expenditure of funds from the $2,000,000 airport bond issue for the erection of hangars for the National Guard and Naval Reserve air units has been authorized by the St. Louis Municipal Airport Commission. The site for the hangars at the southwest corner of the Municipal Airport has been surveyed and construction will start as soon as the funds are released from the bond issue.

RECENT promotions in the Thirty-fifth Division Air Service stationed at the St. Louis Municipal Airport included Lieut. Phil Love, who was promoted to a captaincy; Second Lieutenant Eric Koppel was promoted to firt lieutenant and Sergts. Philip P. Brennan, Francis W. Davis and Ferdinand Racin were promoted to second lieutenants. The annual inspection of the Thirty-fifth Division Air Service was made during the month of April by Brigadier-General W. A. Raupp, commander of the Missouri National Guard, and Col. J. C. French, Regular Army instructor for the National Guard.

IMPROVEMENTS for the St. Louis Municipal Airport in the near future include a concrete taxi strip connecting the north end of the apron with the asphalt runway which terminates at the northwest corner of the airport. There is a similar connection between the concrete runway under construction at the south end of the field and the apron along the west side of the airport. The area between the two runways, extending along the greater portion of the apron, is to be oiled to keep down the dust.

Additional lighting equipment for night landings is undergoing tests at the airport, in compliance with recommendations to the Airport Commission that more floodlights be installed. Several types of lights are being demonstrated, fourteen lamps being arranged in three groups and a Sperry light of the arc type being demonstrated separately. Pilots participating in the tests will make recommendations to the Airport Commission, which will select the group of lights best suited to local conditions. A small building in which a radio beacon will be housed is under construction at the airport. The beacon will be installed by the Department of Commerce and will be operated from the airways radio station near the airport.

W. W. HORNER, chief engineer of paving and sewers for St. Louis, has been appointed by the American Engineering Council as a member of an airport committee to work with the Bureau of Aeronautics of the United States Department of Commerce in developing a report of the diversity and importance of engineering problems in the design of airports. Mr. Horner has planned the drainage features of the St. Louis Municipal Airport and has worked out an experimental runway consisting of a combination of earth, asphalt and crushed rock which has received the attenton of airport experts throughout the country.

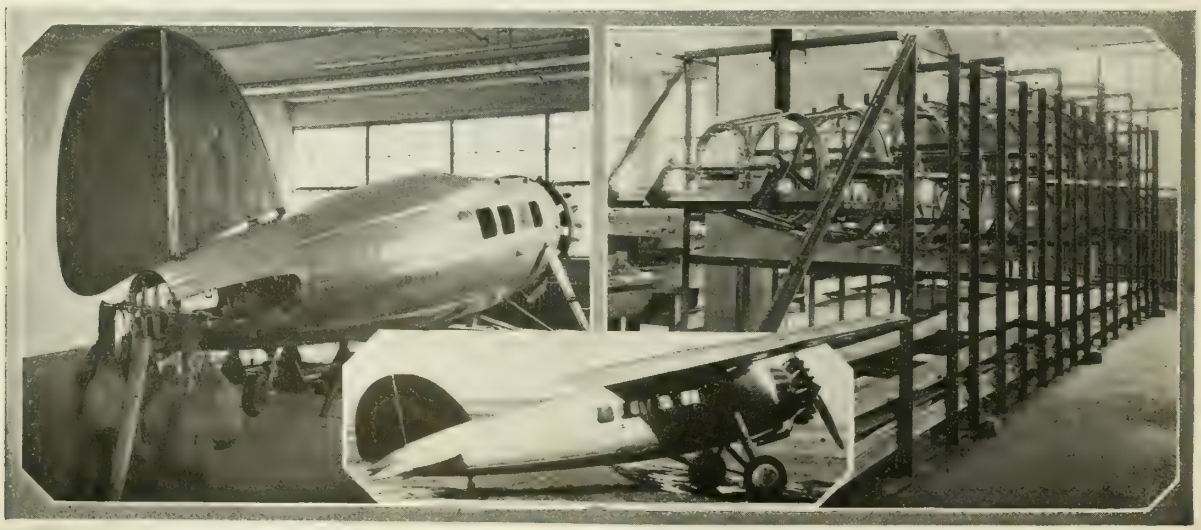
DR. WILLIAM P. DONOVAN has been appointed Department of Commerce medical examiner at the St. Louis Municipal Airport. He succeeds Dr. A. C. Leggatt, who resigned. Dr. Donovan is also flight surgeon for the Thirty-fifth Division Air Service stationed at the St. Louis Municipal Airport.

THE St. Louis Universal Flying School has been approved by the Government as an institution for persons from foreign countries who may be admitted to the United States under students permits without conforming to the usual quota regulations.

The Universal Flying School has been commissioned to service Kinner and Warner Scarab engines. Special machinery used in overhauling these engines has been received from the factories. A master machinist course has been started in connection with this service.

AIR service requiring only five hours and thirty-five minutes between St. Louis and Dallas, Texas, has been announced by National Air Transport through Col. Paul Henderson, vice president, and L. D. Seymour, general manager of the line. The tentative southbound schedule provides for departure from the St. Louis Municipal Airport at 12:25 p. m., arrival at Tulsa at

(Continued on next page)



The metal fuselage and tail assembly of the Lockheed Vega under construction in plant of Detroit Aircraft Corp., Detroit, Mich.

ANNOUNCEMENT



A New Price
A Real Time Payment Plan

WHITTELSEY AVIAN $3,845

Down Payment about $1,358

Balance monthly payments

Handley Page Wing Slots

$450 extra

All Prices F.O.B. Bridgeport, Conn.

In the short space of one year since its arrival in America, the famous Avian has been accepted by the great part of the American public as representing the maximum of safety in the air.

At the International Aircraft Show, Feb. 15th to 23rd, in Saint Louis, the Whittelsey Manufacturing Company presented the 1930 Avian with all its well well known safety features plus a refinement of detail and quality of equipment well in advance of common practice.

And we announce at this time a reduction in price, based on quantity manufacture, coupled with a time payment plan which immediately makes the ownership of an Avian a highly practical investment for business or sport.

Here is downright safe performance that no other light plane can equal. And economy that can't be beaten—the Avian makes every gallon of gas give 20 miles of travel. *You can now buy an Avian for about* $1358.00 *down and balance in monthly payments.* Write today for full information on the plane that's built for sport, safety and economy.

To Dealers and Distributors

When you fly or sell the Whittelsey Avian you have something to talk about. No other light plane has such a record of performance . . . or the equipment. Dealers and distributors are still being appointed. Write for our sales plan, and for full data and specifications of the plane itself. The Whittelsey Manufacturing Company, 220 Howard Avenue, Bridgeport, Conn.

WHITTELSEY



AVIAN

THE OUTSTANDING SPORT AND TRAINING PLANE OF THE WORLD

Say you saw it in AERO DIGEST

(Missouri-Texas continued)

3:15 p. m., Oklahoma City at 4:30 p. m.; Fort Worth at 5:25 p. m. and Dallas at 6 p. m. On the northbound schedule the planes leave Dallas at 10:15 a. m. and arrive in St. Louis at 3:40 p. m.

OKLAHOMA

CONTRACTS for the construction of an addition to the main hangar at the Garland Airport, Tulsa, Okla., has been awarded to the Braden Steel Corporation by the Garland Aircraft Corporation, operators of the field. The addition to the hangar will be constructed at a cost of $4,000 and will be ninety-three feet by twenty feet. The first floor will be used as an engine and airplane construction shop for students; the second floor will contain three lecture rooms for ground school students, and offices for ground school and flight instructors.

THE production schedule of the Star Aircraft Company of Bartlesville, Okla., includes the completion of one plane each week, according to a recent announcement by Roy L. Sturm, manager of the company. Present plans of the company call for the construction of an additional unit to the factory to provide increased production.

The Star company manufactures the Cavalier, a two-place cabin monoplane designed for sport flying and powered with a Lambert engine of 65 horsepower. The Department of Commerce has issued an Approved Type Certificate under which the Star company manufactures the plane. The Cavalier has a wing span of 31 feet 6 inches, overall length of 19 feet 2 inches, and a height of 6 feet 3 inches. Performance includes a high speed of 105 miles per hour and a landing speed of 38 miles per hour.

Officers of the Star Aircraft Company include the following: John H. Kane, president; William Parker, vice president and general manager; John Bain, secretary and treasurer, and Frank Phillips, L. E. Phillips, C. Alexander, and William Davis, directors.

TEXAS

[C. MORRIS]

THE Metropolitan Air Terminal, Houston's latest airport, comprises 800 acres and is located six miles from the city. One half of the field is being developed at present for general use, while the other half will be developed later to take care of dirigible hangars, a balloon field and an exposition ground.

THE aviation committee of the Dallas Chamber of Commerce is making the preliminary plans for the establishment of midway airport between Dallas and Fort Worth. This field will be primarily for the use of air mail planes, eliminating the necessity of planes stopping at both cities. It is believed that the field will be located at the Curtiss-Wright field at Dalworth.

GEORGE E. SHAE, formerly assistant purchasing agent of the Southern Air Transport division of American Airways, Inc., has been appointed purchasing agent for the Robertson division of Universal Aviation Corporation, an American Airways unit. Mr. Shae will be succeeded as assistant purchasing agent by H. W. Bryan, Jr.

THE plan of the government to establish a lighted airway between El Paso and Fort Worth will be carried out by next November, according to Capt. E. M. Haight, airways extension superintendent of the Department of Commerce. Ground and aerial surveys between the two cities will be completed within the next two months.

Beacons of three million candlepower are to be stationed at ten-mile intervals with smaller beacons at four or five mile intervals along the route. The Fort Worth-El Paso airway will be the first ever specifically designed with the direct application of the radio beam.

A NEW airport at Waco, Tex., has been established by Air Services, Inc. The company has under way at present a $30,000 construction program, including fireproof hangars, clubrooms, offices, mechanical department, and boundary and beacon lights. Passenger service, student training, aerial photography, charter work, and agricultural dusting will be carried on by the corporation. Dusting equipment valued at $50,000 is now on hand. When the airport is completed there will be twenty planes in use and a corps of thirty men at the field.

SAN ANTONIO

[M. C. COOPER]

TO test the feasibility of obtaining from commercial aviation schools personnel for training in the Army Air Corps' advanced military flying courses, the War Department will admit ten recent graduates of such institutions to the class that will report at Kelly Field about June 15. This test will be used as a comparison to find out how the graduate student from a civilian flying school of good rating compares with the graduate student of the Government primary schools.

The flying students selected from civilian schools will be entitled to the usual pay and allowances of the flying cadet immediately upon enlistment. If they successfully graduate from the four months' course at Kelly Field, they will be commissioned as second lieutenants in the Air Corps Reserve, with the rating of airplane pilot, and, if funds permit, will be assigned to duty for one year or more with a tactical unit. No applicant will be taken after he has passed his 27th birthday, as required at the primary schools.

One pilot will be admitted from ten approved schools which hold certificates from the Department of Commerce as a transport pilot's flying school.

AN Uppercu-Burnelli two-engined cabin monoplane will be employed by the Inter-Americas Transportation Corporation on the new St. Louis-Mexico City air-rail line, according to A. S. Joffre, president of the organiation. The plane has a capacity of thirty-two passengers and will be operated between St. Louis and the border.

MINNESOTA

[H. A. LINDBERGH]

THE dedication of the Williamson-Johnson municipal airport at Duluth scheduled for July 4, 5 and 6 has been postponed until August 30, 31 and September 1, at which time the combined administration building and hangar will have been erected, the leveling and grading of the field completed and a lighting system installed.

CONSTRUCTION has been started on the $57,000 administration building at the Wold-Chamberlain Airport, Minneapolis. The structure to be completed about July 1 is being erected on the west side of the field directly in front of the small wooden building being used at present by L. D. Hammond, airport manager.

THE Land-O-Lakes Air Service has been organized to furnish air taxi service and train students with the base of operations at the Williamson-Johnson municipal airport in Duluth. The downtown office of the company is located at 104 West First Street, Duluth. C. J. Yoho has been elected president and Lieut. Ira Packard, formerly of St. Paul, is chief pilot.

A GLIDER is being built in the shops of the Great Northern Aviation Corporation of Duluth for use in student training.

CONSTRUCTION of a fence three feet six inches high along the entire south side and part of the west side of Wold-Chamberlain Field at Minneapolis is being supervised by the park board. The fence is being built to prevent the trespassing of visitors, and will be located thirty feet in front of the permanent hangar line. Fifty-foot gates will allow entry and exit of planes to and from the landing area.

THE Minnesota Aircraft Association during its annual election of officers held at the offices of the Standard Oil Company, 1300 Harmon Place, Minneapolis, named Gage Mace, general manager of the Northwest division of the Universal Air Lines, as president to succeed C. W. "Speed" Holman, operations manager of the Northwest Airways, Inc. Fred B. McMullen, Minneapolis, was chosen vice-president; R. R. West, secretary-treasurer; L. W. Lieb, chairman of the board of directors; J. B. Lilliland and L. J. Schler, directors.

WHEN the Duluth Municipal Airport is dedicated July 4, 5 and 6, two bronze tablets will be unveiled in memory of Lieut. Conrad G. Johnson and Harvey F. Williamson in whose honor the field will be called the Williamson-Johnson Airport.

THE ways and means committee of the Minneapolis city council recently approved a request of a $40,000 bond issue to finance the construction of an administration building at the Wold Chamberlain Airport.

(Continued on next page)


MONTEITH


HARTZ


JONES


CLARK


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Elements of Aviation

***by Colonel V. E. Clark,** formerly Chief Aeronautical Engineer, U. S. Army.* **193 pages, 24 illustrations, $3.00**

Before you build, fly, or service a plane or a glider, you must have a clear understanding of the reasons why an airplane flies, why it is safe or unsafe, stable or unstable, controllable or uncontrollable, in various attitudes and conditions—in short, you must know **WHAT** an airplane does, and **WHY**. Colonel Clark's long and successful career as a designer, constructor, and pilot has made him an internationally recognized authority on the subject. In this manual he explains the basic facts about airfoils, airflow, stability and control, propeller effects, powered flight, atmosphere and effects of altitude, construction of airplanes and their design, etc., etc. It is practical, fundamental, and easy to grasp.

Practical Flying

***by Major B. Q. Jones,** Air Corps, U. S. Army.* **210 pages, 6 illustrations, $3.00**

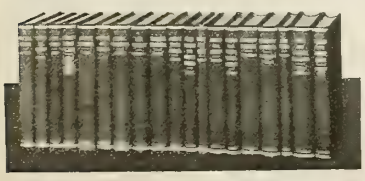
This manual is a time-tested statement of what to do and what not to do in flying. First, Major Jones, famous as the Chief of Army Aviation Training during the war, describes the qualities desirable in a pilot. Then follow chapters on planes, instruments, technical and slang expressions, plane parts, pilots' equipment, methods of plane inspection, and rules for testing the controls and the motor. Then Major Jones tells you all about the actual technique of taxying, the take-off, climb, straight flight, turns and banks, glides, recognizing and correcting for stalls in their early stages, and for getting out of spins. The book throughout stresses safe flying by the observance of common-sense, practical rules.

Aeronautical Meteorology

***by Willis Ray Gregg,** Senior Meteorologist, in Charge of Aerological Division, U. S. Weather Bureau.* **144 pages, 44 illustrations, $2.50**

Presents practical information in concise, usable form to meet the needs of pilots and executives of air transport companies.

Among the subjects included are: how to read weather maps; using local observations for immediate forecasts of probable flying conditions; weather forecasting from clouds; the average height of clouds of each class; the variation in direction and velocity of winds with change of altitude; the frequency of winds from each direction at various altitudes; the characteristics and dimensions of thunderstorms; general circulation of the atmosphere; visibility; instruments and methods of observation; cyclones and anti-cyclones; weather map making and reading; distribution of weather forecasts by radio, etc., etc.



The Navigation of Aircraft

***by Lieut. Logan C. Ramsey,** U. S. Navy; Instructor, Naval Air Station, Pensacola, Fla.* **237 pages, 51 illustrations, $4.50**

This book is a practical discussion of the aerial navigation actually used in ordinary, everyday flight. It sets the proper balance between the three branches of avigation—piloting, dead reckoning, and aerial astronomy—something no other book accomplishes. In addition to its major presentation of the principles and practice of position finding by calculation and observation, it covers fully the mechanical aids of navigation; navigational procedure in practice; general advice and equipment; blind flying; application of weather reports and data to navigation; etc.; etc. Although very recently published, this manual has already been selected by many leading schools as the one book on aerial navigation satisfactory for their students.

Airplane Mechanics Rigging Handbook

***by R. S. Hartz,** formerly Lieut. Colonel, Air Corps, U. S. Army; **and E. E. Hall,** Lieut., Air Corps Res.* **267 pages, 104 illustrations, $3.50**

Licensed mechanics and men who want to qualify for this important work will find all the practical details of their job covered fully in this manual. The authors have had years of experience in Army and civilian flying schools. They show you just how to get an airplane into flying condition and how to keep it that way. The instructions are given in detail, covering the care and inspection of airplanes; dismantling an airplane; stresses and strains; four methods of rigging; sequence of rigging steps; truing up the fuselage, the center section, and the wings; adjusting the angles of incidence, dihedral, etc.; overall adjustments; spars and struts; splicing and fitting; controls and corrections for instability; practical hints for riggers; inspections; installation and correction of compasses; etc.; etc.

Simple Aerodynamics and the Airplane

***by Charles N. Monteith,** Chief Engineer, Boeing Airplane Co.; **3rd edition revised by Colonel C. C. Carter,** U. S. Military Academy, West Point.* **418 pages, 211 illustrations, $4.50**

A completely revised and enlarged edition of a famous introductory textbook widely used in ground and flying schools, in colleges, technical schools and universities. It is ideally suited to home-study use.

Includes a general discussion of airplanes; characteristics and types of airfoils; explanations of lift and drag; center of pressure and its movements; plotting of coefficients and characteristic curves; distribution of forces; selection of airfoils; rate of climb; landing speeds; combining air foils; parasite resistance; characteristics of aircraft engines; discussion of component parts of an airplane; stability considerations and its attainment; control surfaces; the propeller; airplane performance; dynamic loads, maneuverabilty and controllability; structural considerations; wind tunnels; discussion of airplane types for specific performance; methods and instruments for navigation of aircraft; airplane accessories; parachutes; radio; aerial photography; etc.; etc.

Airplane Stress Analysis

***by Alexander Klemin,** Professor of Aeronautical Engineering, Daniel Guggenheim School of Aeronautics, New York University.* **277 pages, 105 illustrations, $7.00**

In this introductory treatise, Professor Klemin shows step by step how to make all the calculations in the airplane stress analysis required by the Department of Commerce. The book is intensely practical—each point is explained with the utmost clearness and simplicity; advanced mathematics has been avoided so far as possible. To show the reader just how the calculations are made in actual practice, Professor Klemin takes an airplane of average characteristics and gives full examples of all the computations required. A preliminary review explains the principles of applied mechanics involved. In concise, easily usable form, data on materials of aircraft construction to which the calculator must frequently refer, are assembled for convenient reference.

Engineering Aerodynamics

***by Walter S. Diehl,** Lieutenant (C.C.), U. S. Navy, Bureau of Aeronautics.* **288 pages, 159 illustrations, $7.00**

Provides practical information on aerodynamics presented in form suitable for direct application by aircraft designers and students of aeronautical engineering.

Lieutenant Diehl shows how the modern theories of lift and drag are applied to everyday design problems. He gives detailed methods for calculating and estimating performance; making performance tests and reducing observed data to standard conditions; how to conduct and interpret wind tunnel tests; how to interpret model test data; design of control surfaces; test data for a number of standard wing sections with methods for selection of an airfoil to meet a particular purpose; flap and aileron test data, etc., etc.

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(Minnesota News continued)

THE old work farm site of 640 acres only six miles from the new Federal building in Duluth is being developed into an airport. To date a hangar space of six acres and the grading of five acres at the apex of two landing strips have been completed. Data is being collected on costs of a municipal hangar and administration building, field markings, etc., to guide the city council of Duluth in planning developments for the year.

[LYLE F. YOUNGSTROM]

A NEW type of airport wind direction and wind speed indicator has been designed by S. H. Young, former engineering instructor at St. Thomas college of St. Paul. Fields at which the new device has been installed or ordered include the St. Louis Municipal Airport, Wold-Chamberlain Field at Minneapolis, and the Tulsa, Boston, Buffalo and Kansas City airports.

The new indicator, which is of rigid airplane-body construction, is eighteen feet long, three feet in diameter and visible seven miles at night, being lighted by a single one hundred watt light. Mounted on ball bearings the Young device indicates wind velocities of more than a mile an hour. In light winds the tail end of the instrument tilts toward earth and as the wind increases the entire body is lifted toward horizontal, thus indicating velocity up to thirty miles per hour, when the horizontal position is reached.

First Annual Northwest Aircraft Exhibition

THE First Annual Northwest Aircraft Exhibition will be held in the Coliseum located midway between Minneapolis and St. Paul, Minn., June 2-7, according to a recent announcement of the committee in charge of the show. Ray Krimm has been appointed director of the exhibition.

WISCONSIN

THERE was a large increase in the sales of the Young Radiator Company of Racine, Wis., for the first three months of 1930 as compared with the same period in 1929, according to a recent announcement of F. M. Young, president of the company. The Young company manufactures radiators, oil coolers, and heating units for factories. New equipment has been added to the company's plant in a program of expansion.

[W. SCOLLARD]

TO widen its operations, Midwest Airways, Inc., Milwaukee, recently increased its capital stock from $12,000 to $100,000. The company has been designated as a factory branch of the Detroit Aircraft Corporation and will handle that organization's planes exclusively. They include the Ryan, Lockheed, and Park ships, the Eastman flying boat and amphibion and Detroit gliders. A service branch will be maintained for these planes and for the Wright and Kinner engines.

A new brick hangar to cost about $25,000 is also to be erected by the firm, according to Valentine Zimmermann, vice president. Other officers of the concern, which does a passenger hopping business and operates a flying school, are James H. Knaup, president and Edward M. Knaup, secretary-treasurer.

ACCORDING to a survey completed by the Milwaukee Association of Commerce air service bureau approximately $2,500,000 is invested in aviation fields and equipment in Wisconsin. The survey covered 150 Wisconsin cities and revealed that there are sixty-eight air fields, of which fourteen are established ports, eighteen landing fields and thirty-six emergency fields.

The largest and best equipped fields are the Milwaukee County Airport and the Curtiss Airport in Milwaukee county, each of which represents an investment of $500,000, including 1930 improvements. There are eighteen municipally owned fields in the state, forty-five privately owned and five provided by the Department of Commerce.

THE Milwaukee County Board Highway Committee has approved the erection of a $30,000 hangar at the Milwaukee County Airport. The structure will be located on the eastern edge of the airport and the proposed dimensions are eighty by twenty feet.

Four contracts, totaling $58,806.80 for grading, drainage and bridging of the airport, were approved by the committee. Much of this work will forward completion of the drainage ditch which runs from northwest to southeast across the airport, and for bridging over the ditch flush with the landing area.

NEILLSVILLE, WISC., citizens are encouraging the establishment of an airport in that city at the Clark County fair grounds. If a landing field can be built, a hangar erected and lights installed, it is hoped that Neillsville will be linked by air service with the airports at Stevens Point, Wausau, Marshfield, Wisconsin Rapids and Eau Claire.

AN 8,000,000 candlepower beacon, visible from twelve to twenty miles in clear weather, has been put in operation at Maitland Field, Milwaukee, on the waterfront. The beacon has been installed on an abandoned 150-foot chimney.

A CONTRACT has been signed by the city of Madison and the Royal Airport of Madison which will permit air mail planes to land at Royal Airport without cost. The city will maintain the field and pay $4,800 per year rental, according to the terms of the contract.

A SCHEDULE of competitive examinations for airport positions has been completed by the Milwaukee county civil service commission. All county airport employes must now take civil service examinations since aviation, transferred by the county park commission January 1, is under the jurisdiction of the county board's highway committee.

SOUTH CAROLINA

DEDICATION of the new municipal airport at Columbia, S. C., was held April 24 and 25. Ceremonies included an air meet, sanctioned by the National Aeronautical Association and the Federation Aeronautique Internationale. A total of $2,575 was awarded in prizes for the winners of the events, in addition to trophies for races participated in by the ships of the Air Corps. The schedule of events included speed races for commercial and military planes, bombing and dead stick landing contests.

ALABAMA

[O. G. JONES]

ANNOUNCEMENT was recently made in Birmingham that the Davis Airlines, Inc., had purchased the equipment and business of the Birmingham Passenger Airways. New equipment will be added to the old equipment of the company and Roberts Field, Birmingham, will be used until the new municipal airport is completed. The name of the Birmingham Passenger Airways will be changed to Davis Airlines. A school, with ground and air instruction, with all branches of commercial flying will be conducted from Roberts Field by the company.

The Davis Airlines also announced that, beginning May 15, daily passenger service between Birmingham, Atlanta, Augusta, Savannah, Brunswick, and Jacksonville, will be available. The tentative schedule will be to leave Birmingham at 8 a.m. and Atlanta at 9:30 a.m., reaching Jacksonville, at 1:30 p.m. and making connections for Miami.

Leaving Augusta on the southbound trip the route will follow the Savannah River to Savannagh. Thence it will go down the Georgia and Florida coast. Travel Air cabin ships will be used on the route and sales and instruction facilities will be established at each of the stops along the route.

WORK on the 300-acre municipal airport at Birmingham is expected to be started within the next few weeks. Grading of a tract of land is about to start. The first runway should be completed within the next two months, but sodding of the field will be impossible until next spring.

DEDICATION of the municipal field at Troy, Ala., was held April 9 and 10. A local celebration accompanied the dedication.

THE Delta Air Service will start daily service in the immediate future on its passenger line between Birmingham and Monroe, La., according to a statement of the firm's officials. Tri-weekly service was maintained formerly over the route which connects with lines to Dallas, Tex.

THE Wright-Hutchison Flying School recently leased Bates Airport, Mobile, Ala., and will use the field to give flying instruction. An airplane repair shop will

be constructed at the field and the airport will be enlarged by the addition of forty acres of land, making an approximate total area in the field of 200 acres. The ground school will be conducted at the University Military School on the Gulf Coast of which Julius T. Wright of the flying school is principal.

New Safety Record is Established by Planes of the Naval Air Service

PLANES of the Naval Air Service flew a total of 21,510 hours per fatal accident and 14,340 hours per fatality during the first six months of the current fiscal year from July, 1929, to January, 1930, according to a recent announcement of the Navy Department. This is in comparison with 6,558 hours flown per fatality during the preceding six months. The ratio of hours per accident during the current fiscal year was about 600 hours in comparison with 708 hours during the preceding six-month period.

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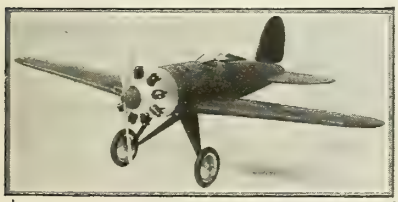
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FLORIDA

THE DINNER KEY seaplane base which is now being used by NYRBA for its operations from Miami has been designated an official port of entry for aircraft entering the United States from foreign countries.

HEADQUARTERS for three firms making gliders, and two airplane manufacturing corporations will be established at Jacksonville, Fla., according to an announcement made recently by W. S. Barnwell, organizer of the Florida Glider Association and the Jacksonville and Fernandina associations. Mr. Barnwell is now the representative for three firms manufacturing gliders and for two companies making powered planes. He has the entire Southeastern district composed of Florida, Alabama, Georgia and South Carolina.

Given the endorsement of the aviation committee of the Junior Chamber of Commerce at a meeting of that body, Mr. Barnwell is developing the local glider association and will install a gliding school. He plans to have a class in gliding organized shortly.

A GOVERNMENT licensed packing and inspecting plant for parachutes has been established by the Curtiss-Wright Flying Service at its hangar at the Miami Municipal Airport. The plant is the only one of its kind in Florida.

[J. WRIGHT]

NO definite action has yet been taken in securing a site for the new municipal airport at Tampa for which a $750,000 bond issue was recently voted. Surveys are now being made of a number of tentative locations. A new site taken under consideration is one of 360 acres fronting on Old Tampa Bay, which has been offered free on condition that all of the funds provided by the bond issue are used in development of the air port there. The offer was made by the Curtiss-Wright company.

GLIDING has become very popular in Florida and clubs have been organized in a number of cities. The first club to be organized in the state was one at Fernandina, which has been active for several months. The Miami Glider Club was organized in February and members are now gliding regularly. The Tampa Glider Club was organized late in March with the following officers: T. C. Kitchens, president; Roger Lum, vice president; and R. C. Wilking, secretary-treasurer. Several other clubs are in the process of formation.

(*Continued on page* 209)

TENNESSEE

THE Memphis Universal Aviation School of Memphis, Tenn., has received the transport rating from the United States Department of Commerce, according to a recent announcement of Alvin D. Niemeyer, director of the school. The rating was granted the school following an inspection by Federal officials of the school's organization and equipment. The Memphis school is operated by the Universal Division of American Airways, Inc., of St. Louis, Mo., which operates five other schools with transport ratings. These schools are loated at St. Louis, Kansas City, Minneapolis, St. Paul, and Cleveland.

MODELS

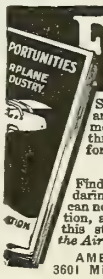


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AN "Aviation Atlas" has been prepared by the Gulf Refining Company for distribution to those participating in commercial and military aviation in the United States. The atlas contains information on the early history and development of aeronautics and present day activities. The contents include photographs of the men who have played most prominent parts in the development of aviation, from the pioneer experimenters up to modern designers and pilots on important flights; photographs and descriptions of heavier-than-air craft showing the progress of the airplane from the early gliders to modern planes; photographs and descriptions of lighter-than-air craft from the Montgolfier balloon to the *Graf Zeppelin;* and a chronology of aviation listing the important events contributing to aviation history up to 1929.

The atlas contains maps of the United States, Europe and South America showing all commercial air transport routes, charts and statistics comparing the development of aviation in the United States and foreign countries, and a map of the world, upon which is traced the routes of historic flights.

Notes on the Uses of Nickel Cast Iron

A HANDBOOK entitled "Notes on Uses of Nickel Cast Iron" has been prepared for the convenience of engineers by the International Nickel Company, Inc., of New York City. The text describing the use of this alloy is indexed under five industries—automotive, aeronautical, general machinery, machine tools, and power. This booklet contains the same information as a booklet of the same title recently issued to foundry officials in the United States and Canada. The text prepared for aeronautical engineers discusses the use of nickel cast iron for castings of the air-cooled cylinder aircraft engine, both radial and vertical types with capacities up to 150 horsepower.

Lunkenheimer Aircraft Specialties

CATALOG No. 3, a new and enlarged edition of "Lunkenheimer Aircraft Specialties," was recently published by the Lunkenheimer Company of Cincinnati, Ohio, manufacturers of engineering specialties. The booklet contains illustrations and descriptions of products manufactured by the Lunkenheimer company, including the Lunkenheimer strainer for aircraft and aircraft-type primer. The company's line of aircraft primers is a development of the former Air Corps Standard Primer No. 890-11 providing a single installation designed for multi-motored planes.

Clayton and Lambert Fire Pots and Torches

"CATALOG D" has been prepared by Clayton and Lambert Manufacturing Company of Detroit, Michigan. The pamphlet contains illustrations and text describing repair parts for fire pots and torches for gasoline and kerosene manufactured by the Clayton and Lambert company. The company has prepared a supplement to Catalog D which illustrates and lists repair parts and contains a jobbers price list.

Guggenheim Blind Flying Report

AN airplane pilot is not an aviator unless he is competent to fly along by instruments, according to a report on blind flying published recently by the Daniel Guggenheim Fund for the Promotion of Aeronautics. The report describes in retail the equipment used by Lieut. James H. Doolittle on September 24 when he took off, flew and landed by instruments alone. The report says that fog landing can be done by any pilot of average ability with a few hours' practice. Complete reliance on his instruments and the ability to use them are pointed out as the only requisites for blind flying.

The pamphlet is being published so that details of methods and instruments utilized in the experiments may be available to those interested, and suggestions are included in the report for future development with the thought that the principles established may be applied to commercial airways.

Advantages of Air Traffic for the Community

"HOW to Make Air Transportation Contribute Prosperity to Your Community," has been published by Merick-Wildish and Company, airport engineers, of Chicago, Ill. This booklet discusses the advantages of air transportation to a community, obligations of civic leaders to aviation, methods of attracting air transportation to communities, airport planning and construction, airport surveys, designs, layout, management and supervision.

Gurney Ball Bearing Manual

THE Gurney Ball Bearing Manual, which includes non-technical discussions of ball bearings as well as technical descriptions for engineers, has been prepared by the Gurney Ball Bearing Division of the Marlin-Rockwell Corporation. The manual is intended as a text book on the subject of ball bearings, in addition to being a ready reference book. The various phases of the subject of ball bearings as discussed in the manual are cross-referenced and indexed, the book containing an alphabetical and a step index.

The manual describes fourteen types of ball bearings which are listed according to the duties for which they are designed. These types are further divided into subgroups which in turn are classified into divisions and series. Approximately 1,000 different size bearings are listed in the manual.

Included in the information on ball bearings written for engineers are formulas for bearing loads, safety factors, limiting speeds, combined loads, selection of types and sizes, and glossary of ball bearing terms. Over thirty pages are devoted to the design and lubrication of ball bearings.

Macwhyte Tie-Rods and Cables

INFORMATION which has been prepared to furnish the aeronautical industry with data on tie-rods, wires and cables used in the construction of aircraft was recently published by the Macwhyte Company of Kenosha, Wisconsin, manufacturers of wires, cables, cords and tie-rods for aircraft. The pamphlet is illustrated with line drawings and contains numerous tables including hardness tests, comparative wire gauges, dimensions of Macwhyte safe lock terminals and standard rigid terminals, square and round drawn tie rods, streamline tie-rods, and weights of aluminum, brass and steel products.

South Bend Lathes

BULLETINS NO. 9 and No. 15 have been published by the South Bend Lathe Works of South Bend, Indiana, describing the nine-inch and fifteen-inch lathes respectively, with the corresponding 235 mm. and 385 mm. metric lathes, made by the South Bend company. The booklets are illustrated with photographs of the lathes and describe the South Bend line of metric system precision lathes designed to cut a wide range of International and French Metric Standard threads from .5 to 8 mm. pitch.

"Better Stampings"—Marquette Tool and Mfg. Co.

INFORMATION headed "Better Stampings" has been prepared for distribution to the aircraft and other industries by the Marquette Tool and Manufacturing Company of Chicago, Ill., developers of the pneumatic and hydro-pneumatic die cushion. The booklet was prepared as the result of surveys made by representatives of the company in over fifty stamping and pressed metal plants.

Specific stamping and drawing jobs are described in detail, photographs are utilized to show the parts made and the equipment used, and a chapter has been devoted to dies. Specifications as to material, dimensions and methods are given.

Safety in Efficient Airport Drainage

BULLETIN C-2 entitled, "Building Safety into Airports with Efficient Drainage Construction," has been prepared by the Armco Culvert Manufacturing Association of Middletown, Ohio. The pamphlet outlines the requirements of airport drainage and of airport construction which is efficient and safe. The text is illustrated with photographs and drawings of completed fields and those in the process of construction and includes factors in airport planning, choice of design, comparisons of fields with or without drainage, rainfall studies, nature of soil, and surface run-off.

The Early History of Felt

"THE EARLY HISTORY OF FELT" has been published by the Western Felt Works. The booklet describes the early processes of felt making and its uses as compared with present day manufacture and application. Included in the products of the Western Felt Company is felt padding for use in airplane construction, including padding for gasoline tanks and padding for oil tanks to keep oil at uniform temperature.

Pioneer Instruments and Equipment for Aircraft

THE 1930 edition of its aircraft instrument and equipment catalog has been issued by the Pioneer Instrument Company, manufacturer of aircraft instruments. The booklet contains illustrations and descriptions of the aircraft instruments produced by the Pioneer company, including instrument panels, altimeters, clocks, air-speed indicators, air logs, and tachometers. Circulars describing Fuel Level Gauge Type 391 which will replace Type 162B, and terminal blocks which have recently been developed, have been prepared and distributed to the aeronautical industry by the Pioneer Instrument Company.

JOSEPH KAUFMAN has been appointed to the technical staff of the National Radio Institute, Washington, D. C. Mr. Kaufman was formerly affiliated with the Langbein-Kaufman Radio Company and an instructor at the Massachusetts Institute of Technology.

AIRCRAFT

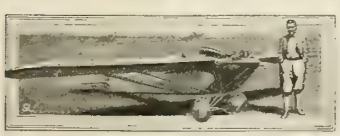
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CHURCH AIRPLANE & MFG. CO.—CHICAGO

(Florida News continued)

THE Daytona Beach, Fla., city commission has awarded a contract for the purchase of lighting equipment for the new municipal airport to the General Electric Co. at $3,550. Installation of the equipment will be made as soon as it is received. The contract calls for a ground floodlight covering two runways with sufficient brilliance to meet Government requirements; boundary, obstruction and landing lights; ceiling projector light indicator; hangar floodlight; windcone light, and miscellaneous equipment. Installation of the lighting and conditioning of the field are to be completed in time for the port to serve as the junction of the East and West Coast night air mail lines.

[J. M. MURRAY]

CLASSES in primary aviation opened in Jacksonville, Fla., high schools recently, the movement being sponsored by the Junior Chamber of Commerce. The courses consist of ten classes, with a complete course to be given at each of the high schools. W. F. Barnwell, flight director of the Fernandina Glider Club is instructor, assisted by local fliers.

LOUISIANA

[C. F. COCK]

THE preparation of an outline of a proposed aviation code for Louisiana has been completed by a sub-committee of the Aviation Committee of the Louisiana State Chamber of Commerce, according to a recent announcement of Travis Oliver, chairman. The proposals will be submitted to the Aviation Committee for approval and later to other organizations in the State. Members of the committee which has prepared the outline, besides Mr. Oliver, include Herbert Bayliss, J. A. T. Amiss, and John D. Ewing.

SELECTION of Jones, Roessle, Olschner and Wiener, architects of Shreveport, to prepare plans for the Shreveport Municipal Airport has been made by the city council. The Southern Air Transport Company has been selected as technical advisors to the architects.

GEORGIA

THE passenger rates of the Davis Air Lines on planes operated between Birmingham, Anniston and Atlanta are being reduced twenty per cent, according to a recent announcement of officials of the company.

On May 15 the company will extend its lines from Atlanta, Ga., to Jacksonville, Fla., via Augusta, Savannah and Brunswick. The schedule will provide for the departure of a plane from Atlanta on the arrival of the plane from Birmingham at 9:30 a. m. Jacksonville will be reached at 1:00 p. m. Planes will connect with boats departing from Jacksonville for the East. Air-water summer excursion trips will be started by the company, negotiation being under way with the Clyde Line Steamship Company for a combination rate.

Universal Glider Club Formed at St. Louis

EMPLOYEES of Universal Division of American Airways, Inc., St. Louis, Mo., have formed the Universal Glider Club and affiliated with the St. Louis Glider Club and the National Glider Association. Officers of the club include: W. P. McFail, director of Universal Flying School, president; F. C. Hockridge, vice president; John Geppert, treasurer, and C. M. Jennings, secretary.

Meetings of the club are held weekly at the downtown classrooms of the Universal Flying School. Gliding activities are held at Kutchins Glider Airport, near Creve Coeur Lake.

THE UNIVERSITY CITY FLYING CLUB of St. Louis, which formerly confined its activities to class room work and models, is now devoting the major portion of its time to gliders. A glider was purchased during the International Aircraft Exposition.

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TWO PATENTS FOR SALE

TAKEN out by the former Art. Smith, famous Fort Wayne flier. Patents cover a Smoke Screen Producer and the Smoke Making Formula. Numbers 1,713,055 and 1,713,056 in the United States, Great Britain, Belgium, Italy, Germany and France.
For full particulars communicate with Mrs. J. F. SMITH, 611 Spring Street, Fort Wayne, Indiana.

FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

FRANCE

A NEW world's distance record of 2,705 miles in thirty hours and twenty-five minutes for seaplanes over a closed circuit was established on April 12 by Pilot Mermoz of the Compagnie Generale Aeropostale in a flight at La Ciotat, near Toulon, France. He used a Laté 28 plane equipped with pontoons and powered with a 600-horsepower Hispano-Suiza engine. M. Mermoz took off on April 11 at La Ciotat, accompanied by a navigator and an observer and completed the flight the following day.

AUSTRALIA

A FARE reduction of twenty per cent has been effected by Australian Aerial Services, Ltd., operators of an Australian airline system, under a plan recently adopted. The reduction in fare is available to passengers who purchase special concession tickets. The tickets are in the form of coupon books which may be purchased at a cost of £40 ($200), and entitle the owner to transportation on the company's lines amounting to £50 ($250) at the regular fare schedule.

GERMANY

[E. P. A. HEINZE]

THE German Air Board recently presented a report of its activities during 1929, which gives a summary of the year's development in German air sports. The board held seventeen meetings, in the course of which sixteen competitions were authorized. The number of flying exhibitions during 1929 dropped to 117 as compared with 172 in the previous year.

Record attempts in 1929 were fewer, continues the report, than in the two previous years. The board was able to confirm twelve German records, eleven of which were recognized as international records by the Federation Aeronautique Internationale, nine for airplanes and two for airships. The international body also confirmed five German sail-flying records. The German Air Board also confirmed seven local sail-flying records and approved three further territories, at Spaichingen, Teck and on the Bergstrasse, as suitable sail-flying grounds.

At the end of 1929, Germany held the following international records: six balloon, two airship, thirty-three powered plane, and five sailplane.

The winning for the first time by Germany of the Challenge de Tourisme Internationale was hailed as the great success of the year. The cup has been handed over to the Aero Club of Germany as guardian, and this club has been entrusted with the organization of the whole contest this year.

The German Aero Club has issued the regulations for the contest. The countries that have already entered for the competition are Great Britain, France, Poland, Switzerland, Spain, Czecho-Slovakia and Germany. Great Britain, as well as Spain and Poland, take part for the first time.

The entrants in the contest will have to cover a distance of approximately 4,690 miles with twenty-seven obligatory stops. The competition will start on July 20 at Berlin Tempelhof Airport, and will finish there on August 7. For the first time the route will touch England, and the machines will have to cross the Channel between France and that country. Surface ships will patrol the line of crossing.

ON March 8th the first International Sail Flying Congress was opened at Darmstadt, the site of the sail-flying research branch of the Rhöen-Rossitten Society. Darmstadt may be called the scientific center of air sailing in Germany, as many students and professors at the college of engineering there have for years devoted themselves to research work in this direction. The well-known Professor Georgii organized the congress, which was attended by the German minister, Dr. Stegerwald, and numerous delegates of German governmental departments. Seven foreign nations were also represented: France, England, Italy, Hungary, Holland, Belgium, and the United States. The two-day meeting was devoted to papers and discussions of scientific and technical aspects of sail-flying and gliding.

CANADA

[J. MONTAGNES]

WITH aviation statistics for the past year nearly complete it is seen that the largest operators in Canada flew greatly increased mileages in 1929, the greater part of which were flown in the unsettled regions. The approximate total mileage is more than double that of the previous year. Nearly six million miles were flown in the Dominion last year, as against 2,730,000 in 1928.

The largest operator in Canada, Western Canada Airways, reports a total of 778,090 aircraft miles flown during the past year. This firm carried 11,151 paying passengers, and a new high total of 1,661,585 pounds of freight were flown over northern routes in planes of the company. Mail carried by this firm amounted to 267,605 pounds. In addition the company photographed an area of four thousand square miles.

The combined companies which now make Canadian Airways, Limited, the second largest transport operator, traveled more than 750,000 miles during the past year. Of this, Canadian Airways contributed 307,316 miles, Canadian Transcontinental Airways 128,840 miles and Interprovincial Airways 285,746 miles. Several smaller companies, which are now merged under the same head, flew a considerable mileage. Canadian Airways now travels four thousand miles daily on its routes, which take in the entire territory from St. John, New Brunswick, to Windsor, Ontario, on contract mail services, and include operations in the Quebec bush. The company carried more than half the Canadian contract mail last year.

Other important operators were Northern Aerial Minerals Exploration, Limited, a mining company, which flew practically all the time in the Barren Lands and piled up a total of 201,988 miles. Dominion Explorers, Limited, a mining company engaged also in sub-Arctic flying, did 161,060 miles, and photographed for its own use an area of 20,000 square miles.

London Air Transport, which has the winter service mail contract from Leamington to Pelee Island, flew 16,000 miles. National Air Transport, Limited, put in 1,204 hours flying 101,560 miles, chiefly on passenger service between Toronto, Hamilton and Detroit, carrying 3,160 paying passengers. Dominion Airways of Vancouver flew 95,520 miles in 2,136 flights. The Curtiss-Reid operations for the year show 4,693 flights and 1,788 hours in the air, of which 1,623 were with passengers. This company, which has fields in operation in Quebec, Ontario and New Brunswick, carried 4,031 paying passengers. The Ontario Provincial Air Service flew 669,423 miles with twenty-six machines, and had but two minor accidents during this time, no deaths or injuries resulting from the accidents.

The total accidents in Canada for the year resulted in thirty-one deaths and twenty-five injuries. Most of these accidents were due to breach of air regulations. Of the fatalities sixteen were passengers, fourteen pilots and one a person on the ground.

J. A. SULLY, president of the Canadian Flying Clubs Association, states that the Winnipeg Flying Club is in the best financial condition of any club in the association. Its statement shows surplus assets of $24,000. Among the club's plans for the coming year is the erection of a new clubhouse costing $15,000 and the purchase of two more planes.

The membership of the Vernon (British Columbia) Airplane Club is now sufficiently large to satisfy the requirements of the Department of National Defence for the issuance of two Moth planes. The airport site of the organization is declared excellent by Major Tudhope of the Department of National Defence.

(Continued on next page)

C. E. Bolduc, radio technician of the Colonial airlines, inspecting Stromberg-CarlsonRadio at the Boston airport.



Interior view, showing instrument board of Pitcairn "Mailwing" used by Colonial. Stromberg-Carlson Radio may be seen at lower right. Note accessibility for tuning and intensity control.

Stromberg-Carlson Radio Increases the *Safety* of Colonial Mail Planes

COLONIAL Air Transport, Inc., is typical of the far-sighted organizations employing Stromberg-Carlson Aircraft Radio for *safe* and *dependable* flying. The ship shown above is one of a fleet of Pitcairns equipped exclusively with Stromberg-Carlsons, and used in carrying the mail on the regular hop between Boston and New York.

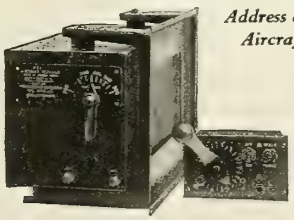
A complete staff of radio operators and technicians is maintained in Colonial's division of communications, under the direction of F. D. Webster, Communication Engineer for this well known company. Emergency messages to pilots, as well as regular beacon and weather service are received from the Hadley Field and Boston Radio Stations of the Department of Commerce.

Being the first aircraft beacon receivers to be used in a regularly established mail route in the United States, Stromberg-Carlsons have an enviable record for dependability. They are recognized today as standard for performance and structural design and will withstand every impediment to *safe* flying!

In the interest of increased *safety* in every branch of flying, we urge you to investigate the merits of Stromberg-Carlson Radio. Full information regarding particular problems of communication gladly given upon request.

STROMBERG-CARLSON TELEPHONE MFG. CO., ROCHESTER, N.Y.

Address all inquiries to our sales representative, Aircraft Radio Corporation, Boonton, N. J.



Stromberg-Carlson Aircraft Receivers are licensed under A. T. and T. Co., R. C. A., R. F. L. and Aircraft Radio Corporation patents.

Stromberg-Carlson is the pioneer builder of Aircraft Beacon Receivers.

Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR MORE THAN THIRTY-FIVE YEARS



Seven Fairchild 71 monoplanes purchased by the Canadian Department of Defense

(Continued from preceding page)

The first glider to be given to a Canadian flying club will be presented by the manufacturers of Buckingham cigarettes to the Toronto Flying Club.

MACDONALD AIRCRAFT, LIMITED, a subsidiary of the MacDonald Bros. Sheet Metal and Roofing, Limited, of Winnipeg, is the newest addition to Winnipeg's aircraft industries. The company will manufacture Edo floats for the whole of Canada.

THE largest airport Canada has yet seen is being built on the eastern border of the town of Trenton on Highway No. 2. It is the Air Force Camp which will replace the present headquarters, Camp Borden. Throughout the winter months the work of clearing the thousand acres of trees has progressed until now the area is open, and fences, woodlands, ditches and roads are being brought to the same level. Farm buildings will begin to be cleared shortly.

One of the big undertakings which is nearly completed is the diversion of Meyer's Creek. The twelve-foot stream has been carried several hundred yards east and a new cement bridge is being built to carry the highway.

SEVEN Model 71 cabin monoplanes were delivered to the Canadian Department of National Defense in March by the Fairchild Airplane Manufacturing Corporation, of New York. The planes are shown in the accompanying photograph. An order for six additional planes from the Fairchild company has been made by the department. The ships will be equipped with pontoons for summer operation and with skis for operation during the winter months. A total of thirty-six Fairchild cabin planes are owned and operated by the Canadian Department of National Defense for transportation purpose, aerial photography and forest patrol.

MEXICO

PREPARATIONS are now being made by the Mexican Department of Communications and Public Works, under the charge of General Andreau Almazan, for the construction of a radio control station at Valbuena Field, Mexico City. The functions of this sending and receiving station will be to keep in constant communication with steamers and to send out accurate weather reports to fliers. It will operate exclusively on a short wave length using five hundred watts.

[M. HURST]

IN 1929 the four aviation companies operating in Mexico carried 9,000 passengers and 87,000 kilos, or approximately 190,000 pounds, of air mail. The combined statistics show 19,000 flying hours, and 1,800,000 miles of flight. In the first two months of 1930 increased activity marked the air service on the lines of the Republic.

AVIATION companies of Mexico in the civil service must construct emergency landing fields along their routes, according to a recent regulation approved by President Ortiz Rubio. In conjunction with the aviation companies the department of civil aeronautics will decide upon the locations where these emergency landing fields are to be placed through the medium of a commission. Consideration will be given to the topography of the route traversed by the airplanes and to air currents. After receiving its report the department will decide upon the locations which offer the best guarantee for the safety of airplanes and their passengers in cases of emergency.

PLANES are to be used in locating the source of clouds of dust that are blown across Mexico City during March, April and May, the latter part of the dry season. Then the spots from which the dust emanates will be petrolized. Most of the dust is believed to come from the basin of Lake Texcoco, which is dry during the winter season.

A DAILY air mail, baggage and passenger line will be established in the near future between Monterrey and Tampico, with probable stops at Linares and Ciudad Victoria, by the Corporacion Aeronautica de Transportes, S. A. A permit for operating this line has been received from the Mexican government and full preparations for operation will be made shortly by the aviation company. Planes used on the new route will be Lockheed Vega five and seven-passenger monoplanes.

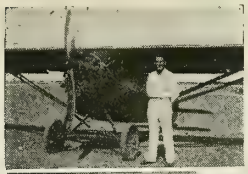
MERCHANTS and prominent business men of Saltillo, Coahuila, recently made requests to the officials of that city to improve the military aviation field there sufficiently to enable the Corporacion Aeronautica de Transportes, S. A., to include Saltillo as one of its stops. The request was considered by the municipal authorities of Saltillo and approved.

THEODORE HALL, president of the Corporacion Aeronautica de Transportes, S. A., has arranged with both the Mexican and American governments for the establishment of a direct air mail and passenger line between Mexico City and Los Angeles. This will be a daily service routed by way of Zacatecas, Torreon, Parral, Chihuahua, Nacozari, Cananea, El Centro and Nogales. Lockheed Vega, five and seven-passenger monoplanes will be used on this route, and the trip will be made in one day. No decision has been reached regarding points to be touched in the United States, but it is thought that either Calexico or El Centro, California, and San Diego will be on the new line.

A CIRCULAR has been sent out by the Mexican Department of Communications calling attention to a regulation made by the section of civil aeronautics which requires foreign pilots flying airplanes in Mexico to have a permit for flying in the republic. The regulation exempts pilots who are employed by aviation companies that maintain a regular transportation service. This rule of the air service department is due to the frequent passage into Mexico of airplanes piloted by aviators who have not secured the permission to fly in Mexico. Hereafter all pilots who land in Tampico or any other part of Mexico, whose flight is international and who are not employed in the service of aviation companies legalized in Mexico, will be required to show a permit to the port captain or some other authorized officer.

AIRPLANES are to be used by the Mexican government to protect the Mexican forests from fires. The secretary of agriculture and the secretary of war and marine are working out the details of the organization and installation of the service which is expected to be inaugurated in the near future. It is planned to detail planes in the service of the army to regular patrols of the forests to detect fires before they have gotten out of control, and to use planes in the fighting of the forest fire. Zones will be created much in a manner that it will not be necessary to construct special fields for the fire service. Each district is to be served by the army camp nearest it. The zoning system will do much to alleviate the fire danger and will serve as a compact fire fighting unit for the country.

ANNOUNCEMENT has been made that application for a concession to open and operate airlines from Monterrey to Laredo, from Ciudad Victoria to Manzanillo, and from Tia Juana to Ensenada, has been filed with the Mexican ministry of communications by the C. A. T. system. C. A. T. at present is operating a line from Mazatlan to Matamoros, and one from Mexico City to Ciudad Juarez. The route between Monterrey and Laredo would be an extension of a route the company is already authorized to install between Monterrey and Tampico.



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Ground Course	**$100**
Free with flying courses	
10 Hours Flying	**175**
20 " "	**375**
25 " "	**425**
50 " "	**775**
60 " "	**900**
200 " "	**2500**
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Please send me your circular. I am interested in your ground course ☐ private ☐ commercial ☐ transport ☐

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THE AIRLINES IN LATIN AMERICA

EIGHTEEN companies were operating air transport services in Latin America on March 1, and planes operated by seventeen of these companies covered a total of 42,092 miles of airways, according to a survey of Latin American aerial travel conducted by the Aeronautics Trade Division, Department of Commerce, and reports of operations made by officials of these companies. The operating mileage of the Compania Inter-Americas de Transportes Aeros with headquarters at Mexico City, Mexico, was not available for inclusion in the survey.

The total airline mileage of the Compania Lloyd Aero Boliviano operators of passenger, mail and freight air transport, is 2,198 miles. The company maintains headquarters at La Paz, Bolivia. Routes operated by the company are as follows: Cochabamba-Santa Cruz, 242 miles; Cochabamba-Vallegrande, 186 miles; Vallegrande-Santa Cruz, 118 miles; Santa Cruz-Puerto Suarez, via San Jose and Robore, 466 miles; Santa Cruz-Yacuiba, 373 miles; Cochabamba-Todos Santos, 125 miles; Todos Santos-Trinidad, 155 miles; Trinidad-Villa Bella, via Santa Ana and Guayaramerin, 310 miles; Villa Bella-Riberalta, via Esperanza, 93 miles; La Paz-Cochabamba, 130 miles.

The Chilean Army Mail Service with headquarters at Santiago, Chile, operates passenger, mail and freight air transport service over a 510-mile route from Santiago to Arica, via Coquimbo, Ovalle, Copiapo, Antofagasta and Iquique; and Santiago-Puerto Montt, 525 miles.

The total operating mileage of the Sociedad Colombo Alemana de Transportes Aereos (Scadta) of Barranquilla, Colombia, is 2,720 miles. The company operates passenger, mail and freight air transport service over nine routes as follows: Barranquilla-Girardot, via Calamar, Magangue, El Banco, Gamarra, Puerto Wilches, Puerto Barrios, Barrancas, and La Dorada, 625 miles; Girardot-Nieva, 94 miles; Barranquilla-Buenaventura, via Cartagena, Lorica, and Sautata, 520 miles; Buenaventura-Guayaquil, Ecuador, 475 miles; Guayaquil-Paita, Peru, 112 miles; Bucaramanga-Puerto Wilches, 80 miles; Cristobal-Sautata, 240 miles; Cristobal-Cartagena, Barranquilla, 484 miles; Bogota-Ibague, via Girardot, 90 miles.

The total operating mileage of the Compagnie Generale Aeropostale of France, operators of air mail service, is 5,035 miles. The company operates the following routes: Buenos Aires-Santiago, via Mendoza, Villa Mercedes, and Rufino, 750 miles; Buenos Aires-Asuncion, via Monto, Caseros, and Posadas, 690 miles; Buenos Aires-Comodoro Rivadavia, via Bahia Blanca, San Antonio, and Trelew, 840 miles; Buenos Aires-Natal, via Pelotas, Porto Alegre, Florianopolis, Sao Francisco, Paranagua, Santos, Rio de Janeiro, Victoria, Caravellas, Bahia, Maceio, and Recife, 2,515 miles; and Buenos Aires-Mar del Plata, 240 miles.

The Condor Syndicate of Rio de Janeiro, Brazil, operates passenger, mail and freight planes over Brazilian routes with a total mileage of 1,011 miles. These are Rio de Janeiro-Rio Grande do Sul, 851 miles; Rio Grande do Sul- Puerto Alegre, via Pelotas, 160 miles.

Planes of the Faucett Aviation Company of Lima, Peru, carrying passengers, mail and freight, fly over a single route having a total mileage of 1,200 miles. The line extends from Arequipa to Paita and includes Mollendo, Ica, Lima, Chimbote, Trujillo, Pacasasmayo, and Chiclayo en route.

TABLE OF OPERATING MILEAGE OF LATIN AMERICAN AIRLINES

Operating Companies	*Miles of Airways*
Lloyd Aero Boliviano	2,198
Scadta	2,720
Compagnie Aeropostale	5,035
Condor Syndicate	1,011
Faucett Company	1,200
Peruvian Naval Air Service	1,100
New York Rio & Buenos Aires Line (NYRBA)	9,798
Pan American-Grace Airways	10,067
Guatemalan Government Lines	240
Aereo Hondureno	168
Compania Mexicana de Aviacion	2,028
Aeronautica de Transportes	2,033
Transportes Transcontinentales	605
Isthmian Airways	47
Porto Rico Airways	100
Pickwick Latin American	2,709
Chilean Army Mail Service	1,035
Total Mileage	42,092

The total operating mileage of the Peruvian Naval Air Service of Lima, Peru, operators of passenger, mail and freight planes, is 1,100 miles. The routes covered by planes of this company are: San Ramon-Iquitos, via Pto Bermudez, Masisea, Contamana, Orellana, and Requena, 800 miles; and Mayobamba-Iquitos via Yurimaguas, 300 miles.

Two operating companies of the United States have extensive services in the southern countinent. The New York, Rio and Buenos Aires Lines, Inc., with headquarters in New York City, U. S. A., and Buenos Aires, operates passenger, mail and freight planes over Latin American routes with a total mileage of 9,798 miles. In addition to the routes operated on the East Coast as for north as Miami, Fla., the lines of the company are as follows: Buenos Aires-Yacuiba, Bolivia, via Rosario, Cordoba, Tucaman, and Salta, 640 miles; Buenos Aires-Asuncion, via Concordia, and Corientes, 670 miles; Buenos Aires-Mar del Plata, 240 miles; and Buenos Aires-Santiago, 700 miles; and Buenos Aires-Ceara, via Montevideo, Rio de Janeiro, Natal, 2,910 miles.

The Pan American-Grace Airways, Inc., with headquarters in New York City, U. S. A., operates passenger and freight planes over fourteen routes with a total length of 10,067 miles. The routes flown over by the company are as follows: Miami-Nassau, 187 miles; Miami-Habana-Belize-Tela-Manugua-David-Panama City-Cristobal, 2,074 miles; Guatemala City-San Salvador, 125 miles; San Salvador-San Lorenzo, 120 miles; Cristobal-Santiago, via Buenaventura, Tumaco, Esmeraldas, Guayaquil, Talara, Paita, Turjillo, Lima, Mollendo, Ilo, Tacna, Arica, Antofagasta, Copiapo, and Ovalle, 3,071 miles; Buenos Aires-Santiago, via Mendoza, and Rufino, 708 miles; Cristobal-Cartagena, 446 miles; Cartagena-Barranquilla, 178 miles; Barranquilla-Curacao, 461 miles; Buenos Aires-Montevideo, 120 miles; Miami-Habana, 261 miles; Habana-Santa Clara-Camaguey-Santiago de Cuba-Port au Prince-Santo Domingo-San Juan, 1,184 miles; San Juan-St. Thomas-St. Johns-Castries-St. Pierre-Port of Spain,

(*Continued on next page*)



(*G. R. Johnson*)

A Stinson monoplane of the Faucett airlines flying between Lima and Ancon

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(*Continued from preceding page*)

752 miles; and Port-of-Spain-Georgetown, 380 miles.

The total operating mileage of the Guatemalan government lines is 240 miles. The company maintains headquarters at Gautemala City, Gautemala, and operates passenger, mail and express service over two routes as follows: Guatemala City, Huehuetanango, 75 miles, and Guatemala City-La Libertad-Flores, 165 miles.

Cia Aero Hondureno of Tela, Honduras, operates three American planes over lines formerly operated by the Tela Railroad, Honduras. The company maintains passenger, mail and express air transport service over the following route: Tela-San Pedro-Tegucigalpa, 166 miles.

The total operating mileage of the Compania Mexicana de Aviacion S. A., is 2,028 miles. The company operates the following routes: Brownsville, Texas-Mexico City, Mexico, via Matamoros, Tampico, 472 miles; Vera Cruz-Merida, via Minatitlan, Villa Hermosa, Ciudad del Carmen, and Campeche, 535 miles; Vera Cruz-Tapachula, via San Jeronimo and Arriaga, 419 miles; Tapachula-Guatemala City, 133 miles; Mexico City-Tuxpan, via Tampico, 244 miles, and Tampico-Vera Cruz, via Tuxpan, 225 miles.

The Corporacion Aeronautica de Transportes operates passenger, mail and express air transport service over the following routes, having a total mileage of 2,033 miles; Matamoras-Mazatlan, via Monterrey, Torreon and Durango, 683 miles; Mexico City-Ciudad Juaraz, via Leon, Aguascalientes, Zacatecas, Torreon, Parral and Chihuahua, 1,003 miles, and Chihuahua-Nogales, via Nacozari and Cananea, 347 miles.

The total operating mileage of the Transportes Aeroes Transcontinentales, S. A., operating passenger, mail and air transport service, with headquarters at San Luis Potosi (scheduled to be moved to Torreon) is 605 miles. The routes of the company are as follows: Torreon-San Luis Potosi, via Zacatecas, 290 miles, and Torreon-Piedras Negras, 315 miles.

Isthunian Airways, Inc., of Cristobal, C. Z., operates passenger and express air transport service over a 47-mile route from Cristobal to Panama City.

The total operating mileage of the Pickwick Latin American Airways of Los Angeles, Calif., is 2,709 miles. The company operates passenger, mail and express air transport over the following routes: Mexico City-Mazatlan, via Morelia, Guadalajara, Tepic, 590 miles; Mazatlan-Nogales, via Culiacan, Sinoloa-C, Obregon, Guayamas and Hermosillo, 666 miles; Nogales-Tia-Juana, via Mexicali and Zaragoza, 369 miles; Mexico City-Gautemala City, via Puebla, Oxaca, San Jeronimo, Tonala, Tapachula and Meriscal, 732 miles; Tonala-Tuxala-San Cristobal-Comitan and Tapachula, 227 miles, and Guatemala City-San Salvador, 125 miles.

The Porto Rico Airways of San Juan, Porto Rico, operates a passenger and express air transport service over a 100-mile route from San Juan to Ponce.

HISTORY OF SCADTA OPERATIONS IN COLOMBIA

Year	Total Miles Flown	Total Passengers	Weight of Mail Pounds	Total Payload Pounds
1920	2,703	12	112	1,904
1921	53,963	379	3,472	67,670
1922	128,743	1,137	10,819	195,888
1923	185,451	1,318	18,569	332,573
1924	169,531	1,084	23,946	207,514
1925	183,206	1,134	27,149	232,221
1926	303,960	2,116	59,450	443,050
1927	329,550	2,667	82,006	546,560
1928	580,846	4,956	111,881	1,066,491
1929	765,015	5,401	133,244	1,150,344

COLOMBIA

SCADTA has surveyed a new air route from Puerto Barrio, Colombia, over the River Magdalena to Medellin, which is situated 125 miles away. The present means of transport by railroad takes twelve hours for the journey, and airplane service between these two cities can make the trip in one hour and twenty minutes. The establishing of this new airline will mean the almost complete linking of all the important towns in Colombia.

URUGUAY

[H. C. PLUMMER]

PLANS for the establishment of a large aircraft manufacturing and assembly plant at Montevideo, Uruguay, by airplane and steel body manufacturers of France was announced recently by Professor Rossignol of France at the conclusion of a tour of South American countries. The project will be carried out by an association of French aeronautical organizations, headed by the Lorrain aircraft interests, which will have a capitalization of 400,000,000 francs ($15,600,000.) Prof. Rossignol covered Uruguay, Argentina, Chile, Paraguay and Brazil on his tour, accompanied by León Cralle and Señor Druillet, representative of the Lorrain interests in Montevideo. He is to submit a report on the aircraft industry in these countries to the Lorrain firm, producer of Dieu aircraft engines.

It is proposed to install the plant at Montevideo, as the logical center of the aircraft industry in that part of South America. The making of bodies, the development of an assembling plant, replacements, repairs, and, eventually, the construction of engines will be the object of the new plant, following successful manufacturing operations already conducted on a small scale at Buenos Aires, Rio de Janeiro and in Chile. The factory center to be established at Montevideo would permit construction and it would serve also as a demonstration center for South American governments and private interests.

Professor Rossignol declared that, as a result of his observations, he believed within a very few years regular aerial lines would be established covering virtually all of the southern part of the continent. The solution of the transportation problem in that section lies in aircraft development, he said. "It has been proved," said Professor Rossignol, "that it is easier to unite Rio de Janeiro, Montevideo, Asunción, Buenos Aires, Mendoza, Santiago de Chile and Valparaiso by aerial routes than by railway or highway."

PERU

[H. GOMEZ-CORNEJO]

FAUCETT AVIATION COMPANY, now operating on regular schedule between Talará, Lima and Arequipa, will shortly extend its southbound service as far as Arica, Chile. A third eight-passenger Stinson-Detroiter, powered with a 420-horsepower Wasp engine, recently arrived at Callao from New York. The organization now has in operation two six-passenger and two eight-passenger Stinson-Detroiters powered with 220-horsepower Wright Whirlwind and Pratt and Whitney Wasp engines. In addition to its regular air transport service, Faucett Aviation Company operates the Peruvian business of the late Huff-Daland Dusters, Inc., and its equipment consists of three Keystone and two Travel Air planes. The following are pilots in service with the company: Elmer Faucett, W. C. Grey, Wayne L. Carleton and H. Elliott.

THE Peruvian administrator general of marine and aviation of the department of civil aviation recently announced the establishment of a new air service for the transport of passengers and mail between Moyobamba and Iquitos. The Iquitos—Moyobamba air route has opened a new means of communication with the far distant town of Moyobamba. The regular air trip, Lima-Moyobamba, via San Ramón, is reduced to 24 hours from the former time of twelve days by railroad and river.

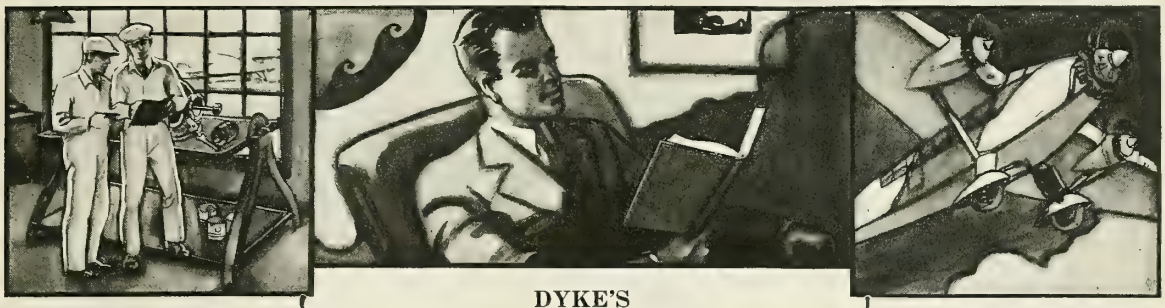
HERR MAX UNGEWITTER, representative of the Junkers photographic section of Berlin, who has been in Lima for some months past, has returned from Bolivia following a short stay in La Paz. Herr Ungewitter has obtained from the Peruvian concessionaries, the Cía. de Fotografía y Agrimensura Aérea S. A., the rights for aerial photographic work in southern Peru.

BRAZIL

A DIRECT air mail service between Brazil and Germany will be established by the Condor Syndicate, according to a recent announcement of officials of the Condor company. The company plans to deliver mail by planes to steamships at the Island of San Fernando, two days at sea from Rio de Janeiro. The mail will be picked up by planes operated by the Luft Hansa when the steamships are at sea two days before reaching Hamburg, Germany. This service will result in a delivery of air mail from Brazil to Germany within nine days as compared with the fourteen days required when the mail is transported by steamship only.

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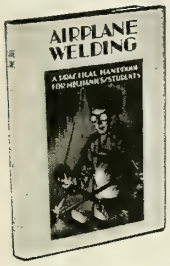
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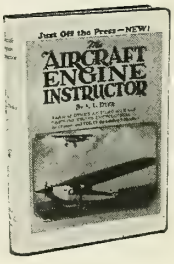
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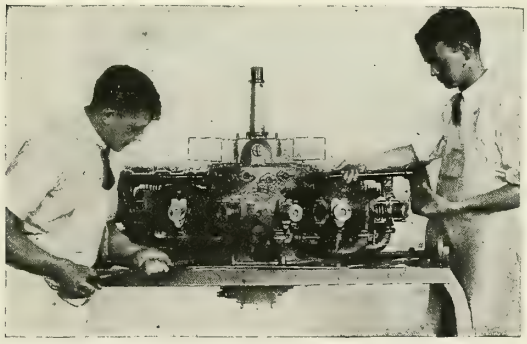
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BANTAM—THE FLYING ROOSTER

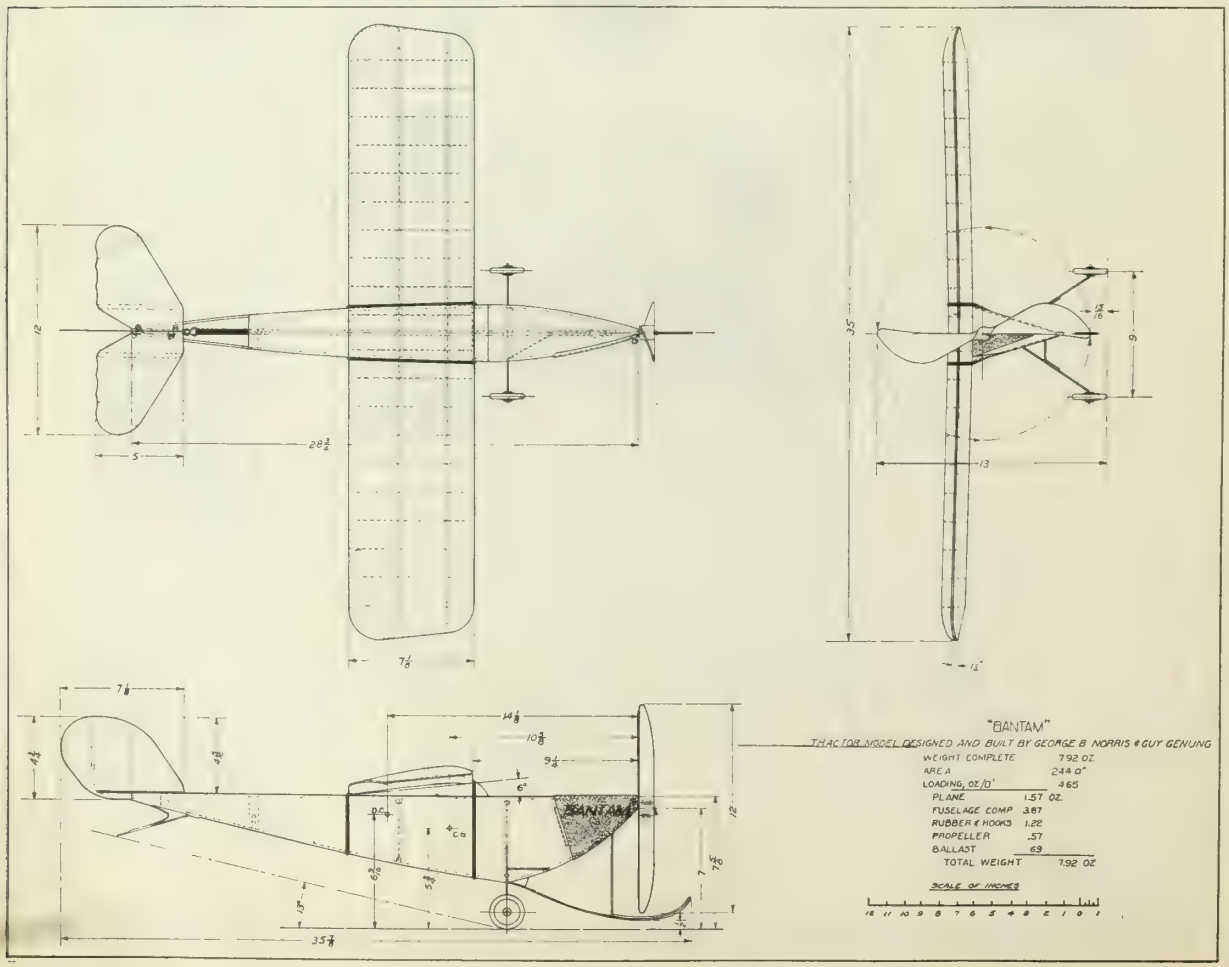
CONSTRUCTION OF A REAL WIND FIGHTER

By R. E. DOWD

THE boys all gathered around to see the new model which George Norris and Guy Genung, of Ithaca, N. Y., had designed and built. There was unusual interest in this model, for neither one of the builders had any previous experience with model airplanes. Perhaps there was a little skepticism in the group, but more likely plain every day curiosity dominated. At any rate these amateurs were quite proud of their plane and held it up for all to see. "Gosh! What a 'chesty' looking bird!" exclaimed Lymie Fisher. "She looks like a Bantam Rooster!" There were other remarks, but that one stuck. The model was thereafter called "Bantam—The Flying Rooster."

Bantam soon earned a reputation as a firm, steady flier. A few changes were required in fin area, etc., but these have all been incorporated in the drawings so that, in reproducing it our readers have the benefit of all these points.

In windy weather Bantam's performance is particularly unusual. It will mount the treacherous gusts and fight its way into the teeth of a nasty wind. Its stability is faultless, and its construction rugged and practical, although somewhat heavy. The same design could be made to weigh about one to two ounces by a more general use of balsa wood, but this would reduce the flying speed and also its wind fighting ability. The duration would be improved, but if one were to design for duration alone the fuselage might better be eliminated. After all, it's handy to have a good rugged model for those windy days when the ultra light fliers must stay under cover. So let's build it—here's what you need:





Bantam, the Flying Rooster, (left) shown from the rear, (center) being launched, and (right) a three-quarter front view

BASSWOOD, PINE OR SPRUCE

No. of Pieces	*Size (inches)*	*Use*
4	1/8 x 1/4 x 32	Longerons and struts
1	1/16 x 1/4 x 36	Fuselage struts
20	1/32 x 3/4 x 7¼	Wing ribs
4	1/32 x 1/4 x 36	Wing spar flanges
1	1/32 x 7/16 x 36	Front spar web
1	1/32 x 5/16 x 36	Rear spar web
1	1 x 1 x3	Nose and tail blocks
1	7/8 x 2½ x 12	Propeller blank

BALSA WOOD

1	1/8 x 5	x 12	Stabilizer
1	3/4 x 3	x 8	Mounting block for main plane

MISCELLANEOUS

2 wheels about 2 in. diameter..Landing gear
Split bamboo.....Wing outline, tail skid, stabilizer, cleats, etc.
Sheet aluminum.....Hood door and fin
Rice paper.....Wind and fuselage covering
Rubber.....Motive power
Wire.....Propeller shaft, hooks, skid, landing gear, etc.
Cement (Ambroid or equivalent).
Thread.....Wrapping joints
Brass.....Propeller bearing
Banana oil.....Dope for rice paper

Build the Fuselage First

As may readily be seen from the front view in the drawing, the fuselage is triangular in section. Full sized machines using a triangular fuselage are quite rare. The historic "Antoinette" monoplane of Latham was perhaps the best known example in the early days. More recently we have the Fairchild monoplane using a triangular rear portion of the fuselage, but this is now replaced by a rectangular form. The Simplex "Kite" exhibited at the Detroit All-American Aircraft Show uses a triangular fuselage. Both of these, however, have the flat side on the bottom instead of on top as in the Bantam design.

Lack of space for enclosing the pilot, controls, etc., is probably the reason this form is not used more generally, for it would seem to have the advantage of lighter weight. In a model we have ample room for the rubber strands, and although there is some tendency to twist under the powerful torsion of the rubber, still the fuselage is both strong and simple to make.

To return to our construction, we first make the upper part by bending two of the longerons and inserting the struts as spacers. All joints are wrapped and cemented. The lower longeron is then added with its side struts. If there should be any difficulty in bending to the required shape, a dip in hot water will make it easy. The wood must be thoroughly dry, however, before using cement or the joint will not be strong.

Both the nose and tail blocks are grooved to take the longerons. The tail block is not located at the end of the fuselage but rather a full inch and a half ahead of the ends of the longerons. A wire hook for the rubber motor is clinched over and drawn into the block to take the torque.

A brass propeller bearing 3/16 inch wide by 3/64 inch thick is bent in the form of an inverted "U" and slipped over the nose block. It is drilled 1/16 inch to accommodate the propeller shaft. The overall length of this bearing is 7/8 inch and the propeller shaft holes are 5/8 inch down from the top. The block fits snugly inside the bearing. Further rigidity is obtained by securing the bearing in position by two small wire brads which pass through the upper part of the U-shaped hanger into the block. It is essential that this propeller mounting and block be carefully made so that weakness will not develop when the model encounters an obstacle or makes a bad landing at the mercy of an unfeeling wind.

On the right-hand side of the fuselage between the nose and the first set of struts or station 1, a 30-gauge detachable aluminum door is provided. This door allows easy inspection of the rubber hook and also allows the rubber to be stretched out for winding. The rear edge of this door is formed into a retaining flange which fits on the inside of the strut. A small screw eye screwed into the block and adapted to be turned after a slot in the door is slipped over, furnishes a simple attaching means for the front end.

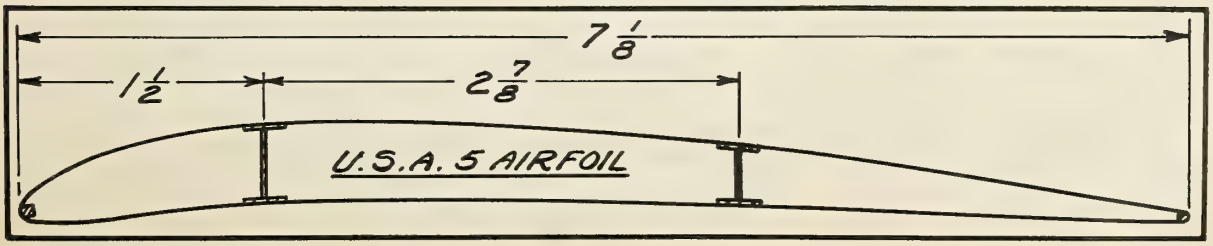
The lengths of the fuselage struts are as follows: Station 1 (at rear of hood door)—4 7/8 inches for sides. No top strut is needed. Station 2—sides 5 inches, top 2 7/8 inches. Station 3—sides 3 3/4 inches, top 2 3/4 inches. Station 4—sides 2 1/4 inches, top 2 inches. Back of the tail block the longerons converge and meet in a nicely streamlined point from which the fin extends to the rear.

As will be noted from the drawing, the top covering is stopped at station 4 so that the rubber motor can be easily removed or replaced. The rice paper is doped with banana oil so that it is tight and smooth. If it is not tight the fuselage will twist badly when the rubber motor is wound up.

Next Build the Wing

The wing is a most beautiful piece of workmanship. It is just as true and free from defects or repairs today as the day it was built, and this in spite of the fact that Bantam has made scores of indoor flights.

In general, the plane is of the double spar, bamboo outline type. The ribs are made of 1/32 inch thick basswood or pine and are cut to U.S.A.-5 outline. (See drawing.) They are 7 inches long, and the front spar is located 1½ inches back from the leading edge. The distance between the center-lines of the spars is 2 7/8 inches. Each rib, after being cut to the proper outline, is lightened out with four so-called "lightening holes." The first of these is in the nose of the rib forward of the front spar; the second and third are between the spars, and the last one is aft of the rear spar. These lightening holes are so patterned that 5/32 inch of material remains to preserve the outline of the rib and 5/16 inch of material is allowed to remain adjacent to the spars and between the two center holes. Of course these lightening holes are made with neatly rounded ends in order



to realize the maximum strength of the material. Four small recesses 1/32 inch deep by 1/4 inch wide are cut in each rib to receive the top and bottom spar strips mentioned later.

The spars are patterned after a design introduced by your Junior Activities editor, known as the sectional web "I" beam type. As might be guessed from the name, the web or vertical part of the spar is in sections between the ribs, and the flanges or horizontal parts are continuous, running from end to end of the wing. In assembling the wing, the flanges, which are of basswood 1/32 inch thick by 1/4 inch by 34 1/2 inches long with tapered ends, as shown in the plan view of the model, are first applied to the ribs and securely cemented, care being taken that all parts are in their correct positions and that the ribs are all uniformly spaced. When the cement has thoroughly dried, the sectional webs are cut from 1/32 inch thick basswood and inserted between the ribs and cemented. If the work has been done with care a light and beautiful structure will be the result.

The construction sounds a bit complicated, but this is not the case, for such wings are really easier to put together than the old-fashioned bamboo rib type, in which the model builder was forced to make a great many lashed or wrapped joints—a real task for unskilled fingers.

The bamboo leading edge is approximately 1/16 inch square and is "let in" to the nose of the ribs by a small notch. Thread and cement are used to secure it in position. The spar webs, which extend out from the end ribs, are tapered on the top edges to 3/32 inch deep, where they attach to the 1/16 inch square bamboo wing tip, which is formed around in an easy bend so that it splices smoothly with the leading and trailing edges. The trailing edge is 1/32 inch by 1/16 inch bamboo and is attached in exactly the same manner as the leading edge. Tapered corner braces are fitted in the wing tips as shown, in order that end shocks will not act directly on the end ribs, but rather will be carried on to the spar.

When complete, the rice paper covering is "doped" to the frame, using three coats of banana oil. A balsa wood mounting block for the plane is shown in position, which elevates the wing to an incidence of six degrees. This is not secured to the fuselage, however, until the proper position has been determined by trial flights. Two rubber strands 1/8 inch wide are used to attach the wing to the fuselage.

We're Ready Now for the Stabilizer

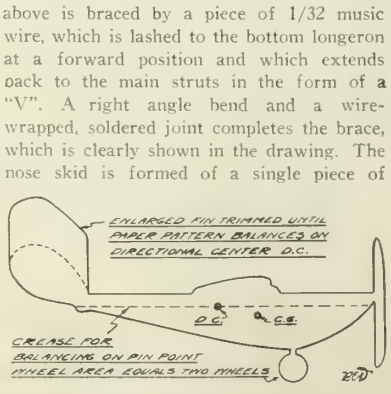
The construction of the stabilizer is extremely simple, since it is made out of a slab of balsa wood. The maximum thickness is 1/8 inch. This point of maximum thickness occurs approximately 1/32 inch back from the leading edge and the section fore and aft of this point is gradually reduced on both upper and lower surfaces. When finished, such a section is known as a symmetrical "double cambered" section. The grain runs laterally, and to prevent splitting, four bamboo cleats are cemented to the lower surface, as shown by the dotted lines in the plan view. The outer cleats are 1/32 by 1/8 by 2 inches and the inner ones 1/32 by 5/16 by 4 7/8 inches. When all finished, the entire surface is covered top and bottom with Japanese rice paper, doped on. It is then lightly sandpapered to smooth it up for the final coat of aluminum paint, which is applied after it is attached to the fuselage. This attachment is by thread, which passes around the fuselage sticks, up through the stabilizer, over small bamboo splints and then around the fuselage sticks again. In short, the stabilizer is "sewn" to the fuselage at three points, two forward and one in the rear.

The Fin Comes Next

The fin frame, as we might call it, is cut out of a single sheet of .032 aluminum to the dimensions given. Four small lugs are provided at the bottom for attachment to the stabilizer. As with the stabilizer, the attachment is accomplished by sewing in position. When the joints are all secure and rigid, the frame is double surfaced with Japanese rice paper. The covering is allowed to extend out onto the stabilizer in order to cover up the lugs and to strengthen the construction further. This type of fin is readily adjustable for steering by bending and will be found highly satisfactory. We are indebted to C. L. Horrocks for its origin.

Now Make the Landing Gear

The main support for the model is a gear composed of two wheels and a nose skid for propeller protection. The wheels are turned out of solid white pine to the exact shape of real airplane wheels. A 1/4 inch by 2 inches "tire" is turned integral with the rest of the wheel and the hub is made 5/16 inch thick. No metallic bushings are provided, since the axles are rather large. Of course a pair of wheels may be borrowed from a toy automobile or wagon, since Bantam needs weight at the nose. The axles mentioned are nothing more than the bent lower ends of the .064 music wire which passes through the fuselage and is lashed to the struts mentioned in the description of the fuselage. Brass flanges 1/32 inch thick by 3/8 inch diameter are soldered to the axle at the points where they bend upward. These serve to restrain the wheels from running inward, and a thread wrap thoroughly glued up prevents them from running off the ends. Plenty of freedom is allowed so that the wheels turn freely. The main supporting member of wire described above is braced by a piece of 1/32 music wire, which is lashed to the bottom longeron at a forward position and which extends back to the main struts in the form of a "V". A right angle bend and a wire-wrapped, soldered joint completes the brace, which is clearly shown in the drawing. The nose skid is formed of a single piece of heavy music wire, which extends forward from the bottom longeron of the fuselage at station 2 to a point well in front of the propeller. At this point it bends back on itself and then vertically up to the bottom longeron again. A small triangular block is lashed securely in position at station 2 between the nose skid and the bottom longeron. The upper end of the vertical part of the nose skid is bent so as to lay snugly against the lower longeron, where it is firmly lashed with thread and cemented in position.



The rear end of the model is supported by a neat skid composed of a strip of bamboo combined with a light music wire V-spring, as shown in the side elevation of the drawing.

The Propeller is Carved Next

The propeller is made of basswood, spruce or pine. It is 7/8 inch thick at the hub, and this thickness is maintained throughout the length of the blades except at the tip where the blade width reduces. The maximum width of the blades is 1 1/2 inches. This width is found on a radius from the hub, which is 1/2 inch in diameter.

The general form of the blades is clearly shown in the drawing, so that further dimensions should be unnecessary. The shaft is made from a bicycle spoke bent into a hook to receive the rubber strands. The propeller is driven by a swiveling device composed of a wire hook driven into the propeller hub, which coöperates with the end of the shaft, which is flattened and bent at right angles. This connection allows the shaft to drive the propeller positively and also allows the propeller to free itself during the glide after the rubber has stopped driving.

Rubber Motor

The power element has been experimented with in order to determine the number of strands that seemed to give the best performance. This number was found to be 22 strands of 1/8 inch flat. Rubber tubing is slipped over the hooks in order to protect the strands, and glycerine is used sparingly as a lubricant. If used too freely, it will soak the paper covering of the fuselage.

How to Determine the Correct Fin Size

One of the most interesting phases of model airplane experimenting is the study of the effects of fin area. Builders usually proceed, as did George Norris and Guy Genung when they built Bantam, with all the essentials, such as wing, fuselage, landing gear, propeller, and so forth, and then just make a fin which looks correct to the eye. Sometimes it works, but many times it does not, with the result that the model just never is a good flier, if it flies at all.

In the case of Bantam the original fin was much too small and the model would yaw (turn) first to the right, then to the left in a form of instability sometimes known as the Dutch Roll after the skating stunt. Let's see what caused it. First we must find our center of gravity or center of weight. This is easily done by hanging the model by a thread first horizontally, then vertically. The point where the two lines intersect—that is, the projected lines of the

(Continued on next page)

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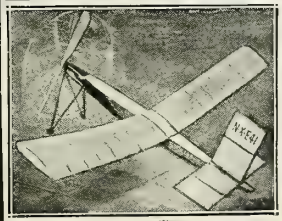
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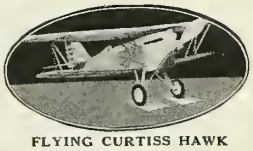
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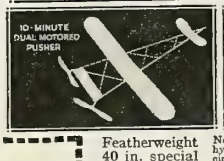
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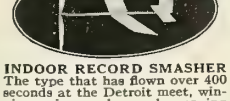
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(*Continued from preceding page*)

thread—will be the center of gravity. Now, in order to have stability the center of lateral area of the whole model must be *to the rear* of the center of gravity and preferably *above* the center of gravity. This center we call the directional center or D. C. Perhaps, you have noticed this point marked on the other models presented in this section and wondered what it meant. An explanation has been withheld until now because we felt it had better not be taken up too soon.

Perhaps now the function of the fin is clear, for if the directional center doesn't come where it should, we must move it with more or less fin area. But how far from the C. G. should the D. C. be? This is the problem.

At this point we must bring in an empirical formula. Don't be frightened at that word. It simply means a formula which has been derived from experience rather than from theory. In other words, by studying a great many models, we find that we can be pretty sure of stability if we proceed as follows: Take the wing span and the length of the model in inches and add them together. Now multiply that sum by a certain constant which ranges from .025 to .050. In other words, we can take a mean value of .037 and here's our formula (S(span) + L(length)) X .037. Now in the case of Bantam our span is 35 inches and the length is 35⅞ inches. By adding these together we have 70⅞ inches or say 71 inches. This figure multiplied by .037 gives us 2.62 or 2⅝ inches for the distance between the C.G. and D.C. But now that we know where the D.C. should be, how can we determine the fin size? This is even simpler.

As stated before, we are dealing with the lateral area of the model; consequently, all we need to do is cut out a paper pattern representing the side view of the model, but allowing a fin abnormally high. (See drawing). If we now indicate our C.G. and D.C. on the paper pattern and crease it end to end, passing through the D.C. we find it stiff enough to be balanced on a pin point. With the fin abnormally high, but of about the correct width, we find that the balancing point is somewhat back of our desired D.C. We therefore trim the height down until we get the correct balancing point, namely right on the D.C. and that is our fin size.

If a final checkup is desired before making the fin, a piece of light cardboard may be cut to the size indicated and the model test flown. Of course, care should be taken to keep the C.G where it belongs by balasting, while these tests are being run.

It might be asked what the length and span of a model has to do with the location of the Directional Center, and we can only say that by summing these we place the model in a class for size, and then can lay out the problem in that proportion.

Performance

At the opening of this description some of the merits of Bantam's performance were touched upon. A few additional remarks might not be out of place. The "take-off" when R.O.G. flights are made is extremely pretty. The tail lifts off after a run of a few feet, and on gaining more speed, the whole model rises after a few light wheel touches. In a calm, a run of about 15 feet usually suffices for the take-off. Once the model is off, the flight is a steady climb to heights ranging from 25 to 100 feet where the excess power becomes exhausted. At this point the little flier flattens out and either starts cross-country or circles overhead in graceful, sweeping circles. Because of the realistic design of the fuselage there is a striking resemblance to full-sized machines when in the air. Bantam is well worth building and we want to know all about your success with it.

Some More High Spots to Remember

What pioneer machine used a triangular fuselage?

Can you name the parts of an I-beam?

What is a symmetrical double cambered section?

What is yaw?

What is Dutch Roll?

What is the Directional Center?

Knowing the span and length of a model, how can you find the correct distance between the C.G. and the D.C.?

Explain how you can determine the fin size after knowing where the D.C. should be?

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THE following articles written for AERO DIGEST are available in reprint form. Please write name and address plainly when asking for reprints and enclose stamped and addressed envelope. No charge is made for reprints.

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THE JUNIOR LOCKHEED VEGA—February issue.

THE CHUPP "LITTLE BITTY" BIPLANE—March issue.

CHUPP GASOLINE ENGINE—April issue.

PARADOX IN AVIATION PUBLICITY

(*Continued from page* 66)

he rushes to cover. That, as any railroad or steamship press representative will verify, is not the best way to deal with newspapers. It seems reasonable to state that, to whatever extent the aviation industry has committed this error, it has placed an impediment of unreliable and misleading information in the way of its own progress.

Not only transport companies, but aircraft and engine manufacturers, and particularly air schools, have released advertising and news statements of a glamorous nature, the effect of which is to create the impression that flying is a rare accomplishment, and that it is unusual, rather than usual, for airplanes to perform satisfactorily and safely over long periods unless in the hands of highly skilled men.

Getting back again to the paradoxical presentation of the industry to the public, it must be admitted that much of the information given to the press is sound and constructive. The subject matter of such information is, in general, to the effect that there is no mystery about flight, that airplanes perform according to natural laws which are the same at all times. It points out that the principles of aerodynamics are now well known and that their application is dependably controllable with intelligent management. It makes clear the fact that structural failure of aircraft is now extremely rare, that nearly all accidents result from personal errors. It explains that safety in the air depends almost entirely on common sense and ordinary precautions such as those practiced by careful drivers on the highways, plus a certain amount of preliminary training.

But against all this is the stream of fiction and semi-fiction directed to all classes of readers. The writers of that entertainment are mostly beyond the reach of those responsible for the continued growth of aviation, but too much encouragement and material is given them by members of the industry. When a well-known pilot tells a writer about the great difficulties of handling an airplane, the public believes him. If all members of the industry tell the facts to editors and writers, we will make better progress. When a man reads in one column that "the intrepid flier" succeeded in reaching his destination with a load of air mail, and in the column next to it, that one can learn to fly in ten hours, he naturally concludes that something is wrong. Unwilling to see such a vast mental difference between himself and the not-unusual-looking "intrepid" one, he decides that the latter is a gambler with life, and therefore out of his class. The facts would be much more convincing to the prospect for air travel and private airplane. And after all, a plain story, plainly told, is more likely to interest the intelligent class that can afford to buy air transportation.

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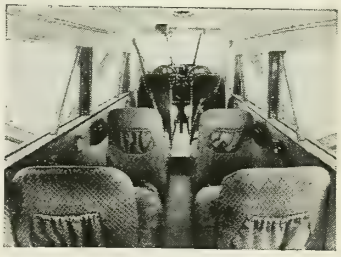
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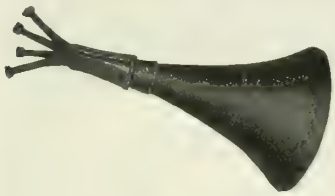
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THE use of radio in aircraft operation is made doubly valuable with the new Racon amplifier. Air transport companies will find it of inestimable value in the safe delivery of passenger and express cargoes during bad weather. During recent tests in Chicago, in a snow storm, the voice was distinctly audible more than a mile away. No pilot or operator can fail to realize the import of establishing communication between the plane and the ground crew preparatory to landing when visibility is so poor that a safe 'set-down' is nothing more than a matter of a good guess and plenty of luck.

FOR AERIAL ADVERTISING

Through the Racon Airplane Speaker the broadcaster's voice can be heard for miles. Even though the plane may be hidden in the clouds, the voice—or music—can be heard above the din of city traffic. During the Chicago tests music was broadcast from a phonograph record and was heard very clearly several miles away.



LIST PRICE
$35

Baby Electro Dynamic Horn type unit capable of handling undistorted output of 15 watts.

The Racon Airplane Speaker was designed for airplane or airport use. It is very light and compact and was built to withstand rapid changes in air pressure. Instead of the usual dynamic unit, the Racon horn is equipped with four apertures utilizing four Racon Giant dynamic units. Consequently the Racon horn has four times the ordinary volume.



Giant Dynamic Horn unit capable of handling undistorted output of 25 watts.

Write for complete description and price

RACON ELECTRIC COMPANY

3 Mutual Street, Toronto, Canada

18 Washington Place
New York City

Slough Bucks, England

CREATIVE AIRPLANE SELLING

(*Continued from page 60*)

tion which will be strong enough to make a real sale.

We are in the airplane era. The airplane is a new and profitable tool for business. There will never be fewer airplanes used by business in its tasks. On the contrary, there will be an ever increasing number. But business will not be sold by glittering generalities and oratory about the "air age." It will buy this new instrument from the creative salesman who is able to get over on the prospect's side of the fence and gaze at his business through his eyes. The sales will be made by salesmen with the training and acumen to sell the "product of the product." Airplanes can be sold to business concerns only by establishing the "compensation," basis of the sale.

AIR—HOT AND OTHERWISE

(*Continued from page 68*)

They could conduct shows that would do the industry much good. They'll solve their problem in a way that will not be a financial drain on the manufacturers of planes and accessories."

This is another commonsense idea which should be annexed by those running the Chamber.

AND this, friends, brings us back to our old problem—the N. A. A. The few words that we said on this subject last month brought in a great response, all good. The suggestion which seems to have made the greatest impression had to do with making Orville Wright honorary president for life. Never has there come to our

(*Continued on next page*)

AIRCRAFT PLYWOOD

exceeding government specifications

WELDWOOD
domestic panels of superior construction.

CAWIT
made by Wittkowsky of Berlin.

furnished to the largest factors in the aircraft industry but available to all at prices consistent with large scale production.

Write for price list

UNITED STATES PLYWOOD CO.,
INCORPORATED
603 West 36th Street, New York, N. Y.



Straight Talks to Airplane Dealers . . . No. 1

Are You Still in the HORSE AGE Selling 1920-Model Airplanes?

Dobbin is dead . . . and so are a great many models of light airplanes still stored away in hangars, awaiting buyers who will never buy! You can't sell 1920-model ships in this year of grace, 1930!

With the entire aviation industry going through a transition period, this fact is particularly noticeable: in the light 'plane field, the science of aerodynamics is producing new and more efficient designs . . . lighter ships, faster ships, ships capable of performance undreamed a few years ago. Powered with air-cooled engines, these modern light 'planes will almost carry their weight in passengers, fuel and baggage.

The Inland Sport is such a ship. On a recent 2,865 mile flight to Mexico City and return an Inland Supersport weighing only 880 pounds carried 690 pounds gross load . . . consumed only $53.72 worth of gas and oil . . . made an average speed of 99 miles per hour. This is the ship which holds the world speed record for light 'planes at better than two miles a minute. This is the ship which set an American altitude record.

This is the sort of ship you need to sell nowadays if you expect to stay in business!

Inland Aviation Company will soon complete its plan of national distribution . . . based on the fact that *the modern aviation merchant must have modern goods to sell.* If you are a *merchandiser,* interested in selling airplanes for *sport, training* and *transportation,* write for the Inland Dealer Franchise Plan.

Further details gladly sent on request.

INLAND SPORT
KANSAS CITY

INLAND AVIATION COMPANY
FAIRFAX FIELD
KANSAS CITY, KAN.



INLAND SPORT MONOPLANE

TOMORROW'S PLANE TODAY

Manufactured at Fairfax Field under Approved Type Certificates No. 259 and 315





Let BOEING Air Mail Pilots

teach you to fly!

EVERY day Boeing planes fly 15,000 miles with the air mail —carrying more than 50% of the U. S. total poundage. A quarter of all U. S. air mail is carried by *Boeing pilots* flying *Boeing-built* planes on *Boeing-operated* airways.

On this practical foundation the Boeing System of Aeronautical Training has been built. *Experience*—not just theory —forms the background for every course. Boeing instructors are seasoned pilots—some with as many as 5,000 flying hours —to whom small airports, bad weather, mountainous terrains and other flying conditions, are merely a part of the day's work. With an instructor of this type in the front cock-pit, you will learn many "tricks of the trade"—in addition to those important fundamentals that govern safe air transportation.

Advanced training makes a competent pilot. Don't just "pick up" flying. Choose your school with an eye to your future. Ask yourself: [1] *"Which school's diploma will be the best endorsement when I seek a connection after graduation?"* . . . [2] *"How complete and up-to-date is the equipment I will use?"* . . . [3] *"How competent are my instructors?"*. . . Check both ground school and flying courses . . . By these tests Boeing training is a sound investment.

New classes form quarterly. Mail coupon below or write us about your plans for an aeronautical career.

BOEING
SCHOOL OF AERONAUTICS

(Division of United Aircraft & Transport Corp.)

BOEING SCHOOL OF AERONAUTICS AD-53
Airport, Oakland, California

Gentlemen: I am interested in

☐ Private Pilot
☐ Transport Pilot
☐ Limited Commercial
☐ Master Mechanic
☐ Boeing Master Pilot
☐ Airplane and Engine Mechanic
☐ Aviation Executive

Name.....

Address.....

City.....*State*.....

AD-430

(Continued from preceding page)

desk so enthusiastic a response from the air minds of America.

We believe that Mr. Wright would accept if the suggestion were made to him officially. He would not be asked to give much time to the job, but his endorsement would insure that million members which, as we have contended since 1925, the organization should possess. The need for a million voters organized to support American aviation is self-evident. We might have had them by this time if N. A. A. leadership had been of that virile sort which would fight the battles for civil and military air development. Enemies of aviation can do and have done much in Washington and elsewhere. Friends of aviation could do more. With the right kind of an organization behind it, the Watres bill, in the interest of the air mail operators and backed by President Hoover, would now be a law. None would have dared to oppose this necessary legislation had it had strong backing. Such Senators as McKellar and Bratton would have been told to keep their fingers out of aviation except when those fingers itched with the desire for constructive work. A million votes would be impressive to every man in political Washington.

A glorious future waits if we will grasp it. The N. A. A. can help the nation in getting hold of it. But in order to do this, it must have a program which it intends to back and actually backs. The reason it now has 14,000 delinquents on its books and less than 8,000 paid memberships is that it never has had a program truly representative of the industry's requirements. But it's not too late to make another start, and this should be done at Chicago, at the next convention, the first move in that direction being the reduction of dues to one dollar. Another important step should be the admission of every aviation club in America to membership, with the provision that each shall retain its local identity and name, yet be definitely associated with the national body, taking active part in the promotion of thoroughly approved national and State legislation.

Let the N. A. A., reorganized and revitalized, get back of the glider movement, remembering that this country will have half a million gliders in a few years, and that every boy of eighteen who flies a glider soon will become a voter.

With voters whose interests are centered in aviation, the industry will be safe, wax healthy and grow beyond our present dreams. Many chapters of the N. A. A. today have not enough members to retain their charters under the accepted rules. No chapter has as many members as could be secured by proper leadership.

There is an obvious answer.

First get rid of Bingham. Make William P. MacCracken, Jr., the organization's active president and then watch for new non-stop, new altitude, new cargo-carrying, new speed records for the sad old organization. As president, he would make the association represent exactly what its charter calls for. He is absolutely fair and above board; he possesses punch. By the exercise of these great qualities he would quickly pull into coöperation the warring factions of the industry. So — —

DELEGATES TO THE CHICAGO CONVENTION: MAKE BILL MacCRACKEN YOUR ACTIVE PRESIDENT AND GET *ACTION!*

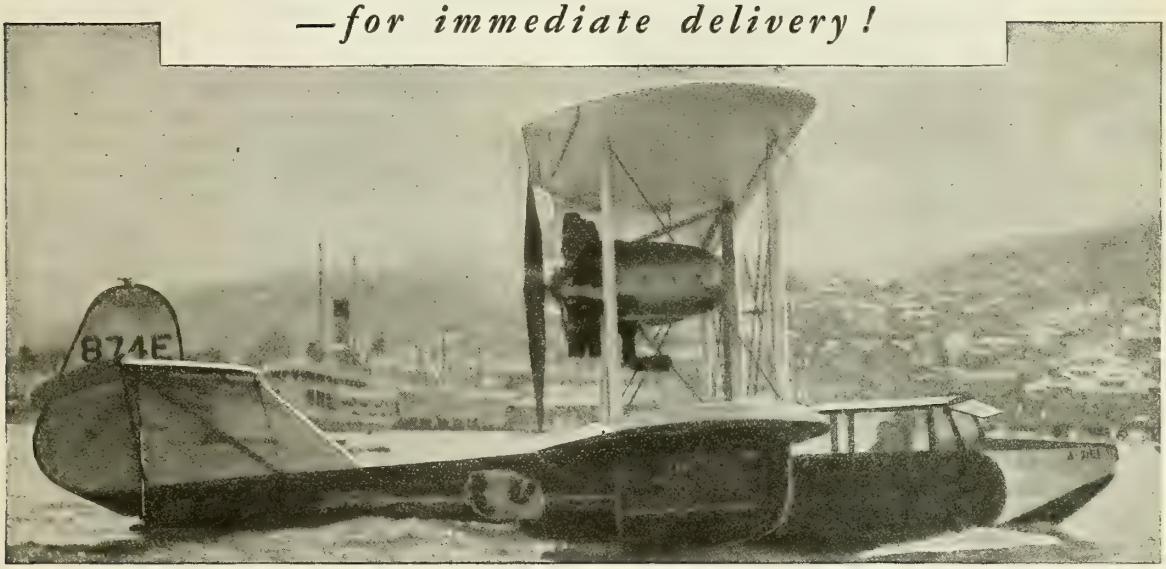
And note that I said make MacCracken ACTIVE president. None could be better; he would be the best.

And, having made MacCracken active president, make

(Continued on next page)

Now — More BOEING FLYING BOATS*

—for immediate delivery!



* Model 204, as recently improved, is even superior in performance to those so successfully operated by Western Air Express (pictured here), Barnes & Gorst (Seattle-Victoria Air Mail contractors), Western Canada Airways, etc. It is the outstanding flying boat on the market.

The original Boeing reputation was established in the construction of flying boats, one of which, with 500,000 miles of flight, has been flown farther than any other airplane. Each time a better flying boat has been built, Boeing has set the pace.

Now Model 204 *has been improved again.* Its speed has been increased 15 miles per hour, take-off time reduced 8 seconds and climb increased 250 f.p.m. Test landings in rough open seas have demonstrated Model 204's staunch hull construction. Rigid schedules over routes scattered from Alaska to Florida—flying good weather and bad—have proved it airworthy, speedy, economical to operate! And, once inside its roomy, sound-proofed, glass-enclosed cabin, you'll enjoy the comforts of a yacht at 133 miles per hour.

Brief specifications are given below. Operators and sportsmen are invited to write for detailed data.

BOEING AIRPLANE COMPANY

Division of United Aircraft & Transport Corporation

SEATTLE, WASHINGTON

(In Canada: Boeing Aircraft of Canada, Ltd., Vancouver, B. C.)

PERFORMANCE

(Boeing Model 204—**with full load**)

Speed: High speed 133 m.p.h. Cruising speed 110 m.p.h.

Cruising Range: 450 miles (4½ hrs.)

Quick take-off: slow landing: Takes off in 15 seconds after 750 ft. run. Lands at 59 m.p.h.

Power plant: 1 Pratt & Whitney 450 H.P. "Wasp" engine.

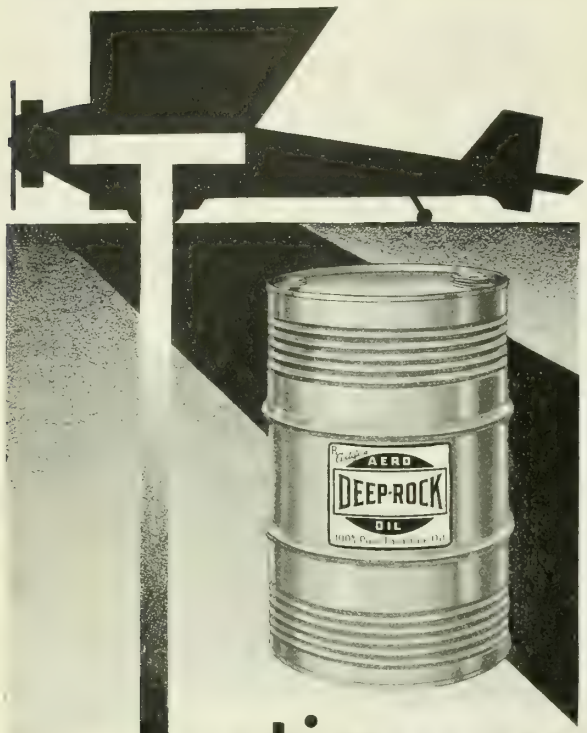
Actual pay load: 5 passengers and baggage (913 pounds).

Fabric covering: Permits speedy, economical, accurate inspection—a safety factor.

Mahogany Plywood Hull: Eliminating possibility of danger of salt water corrosion and materially reducing maintenance cost.

Completely equipped: No extras to buy, no weight to add.

Special features: Noise-proofed and insulated cabin; separate baggage compartment; electric inertia starter; navigating lights; elevating windows and windshield, non-shatterable glass; special compartment for anchor gear. Comfortable leather-upholstered seats. Complete instrument board equipment including air speed meter, altimeter, Pioneer compass, bank and turn indicator and usual engine gauges.



Testimony
from Men you know

"Our endurance flights in the Chicago 'We Will' certainly proved the value of Deep-Rock Aero Oil. The plane, a Stinson powered with a Wright J-5 engine, stayed in the air 291 hours the first time, until rocker arm trouble forced us down. Then we put a 'Whirlwind-300' (J-6) in the ship and stayed up 263 hours. Fog forced us down and inspection showed the engine to be in perfect condition. This we feel is largely due to the use of Deep-Rock Aero Oil."—John and Kenneth Hunter.

Watch this space each month for expressions from men high in aviation regarding actual experience with Deep-Rock Aero Oil and Deep-Rock Fighting Grade Aviation Gasoline.

Deep-Rock Aero Oil is made in four grades, every drop Certified and every drum Sealed so that oil cannot be tampered with. New refining processes produce Deep-Rock Aero Oils from pure paraffine base crude. Strict adherence to specifications insures absolute uniformity. For complete data write "Dick" Allen, Aircraft Division...

DEEP ROCK OIL CORPORATION

General Sales Offices: 300 W. Adams St., Chicago

Refinery: Cushing, Oklahoma

(*Continued from preceding page*)

Orville Wright your honorary president.

With these two names printed on a letterhead as they are indelibly printed on the pages of America's aviation history, what could stop the N. A. A.? Growing in membership, it would grow in power to make itself the world's leading organization promoting the interests of human flight. For, even as the railroads once were, aviation now is the greatest potentiality toward the advancement of civilization.

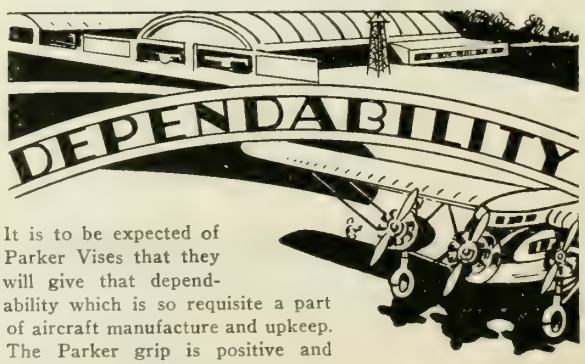
Since Bill MacCracken is a busy man, it may be argued that perhaps he could not give much time to such a job. But he is one of those who can do a great deal in a short time. He could and would do more in a year for the N. A. A. than Bingham could or would during the balance of his life. MacCracken probably would try hard to refuse. He has given much of his time to aviation at a great personal sacrifice, but has he ever been found wanting when aviation needed help?

MAINTENANCE METHODS

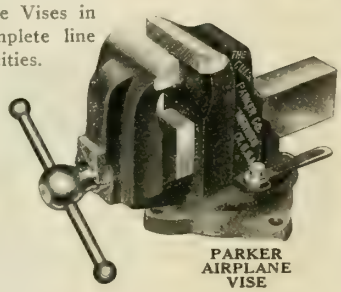
(*Continued from page 64*)

tenance system would be complete without a brief description of the stockroom and the cost accounting department. Without adequate parts and materials, no shop can operate efficiently; yet with an excessive inventory, no enterprise can show a profit. Therefore, a trained storekeeper and a carefully organized system of controlling and issuing materials is an absolute necessity. A "perpetual" inventory is kept for each stockroom in the Pan American System. Each item at each station is represented by a stock card, on file in the "Central Stores Department" at a main base such as Miami. All requisitions on stores and receiving reports

(*Continued on next page*)



It is to be expected of Parker Vises that they will give that dependability which is so requisite a part of aircraft manufacture and upkeep. The Parker grip is positive and constant. Available in the specially designed Parker Airplane Vises in three sizes. Also a complete line of all types and capacities. Write for booklet.



PARKER AIRPLANE VISE

THE CHARLES PARKER COMPANY
Meriden, Conn.

Makers of the Famous Parker Gun

PARKER VISES

GRIP LIKE IZZY

New York Salesroom 25 MURRAY ST., N. Y. C.

SUCCESSFUL GRADUATES . . .

NOW EMPLOYED IN AVIATION

have built the VON HOFFMANN REPUTATION



The accomplishments of Von Hoffmann graduates now in the industry have made this great school outstanding in aviation. Many of them have now risen to positions of importance, and are calling for men with Von Hoffmann training. They know better than anyone else the calibre and ability of Von Hoffmann graduates—the finest type of pilots and mechanics—men who succeed in aviation because the training they received was beyond government requirements. Thorough instruction and practical training on a variety of late types of Government Licensed modern aircraft, open and cabin, is the reason Von Hoffmann graduates are filling responsible positions throughout the industry—piloting ships, building, repairing and testing them.

Our courses cover actual flying, theoretical instruction, aero navigation, airplane instruments and practical shop training in airplane structure and repair of various type planes—motor construction, adjustment and repair of different type motors including both water and air cooled. A Government rated school located on a $2,000,000 airport. Reasonable prices and a liberal time payment plan. Make your start in aviation.

Mail the coupon now!

MEMBER

U. S. Gov't. Approved School for Transport, Limited Commercial, Private Pilot, Ground and Flying.



VON HOFFMANN AIRCRAFT SCHOOL
429 Lambert—St. Louis Airport
ST. LOUIS, MISSOURI

VON HOFFMANN AIRCRAFT SCHOOL
429 Lambert—St. Louis Airport
St. Louis, Mo.

Name.....

Address.....

City..... State.....

Age..... I am interested in

☐ Flying Courses ☐ Mechanics Course
☐ Welding Course ☐ Home Study



Just One of Several Styles

BASS
Flying Moccasins

BASS Aviation Over-Moccasins were developed by G. H. Bass & Co. for the United States Army Air Service during the World War and have since been adopted by the Navy.

Wherever warmth and light weight are desired these fleece-lined moccasins of durable Elkskin, which fit right over your regular shoes or boots, are the answer. They should be part of every flier's equipment and are made in several styles for both men and women.

Bass also makes a long line of quality high cut boots of both Moccasin and Goodyear Welt construction, which combine style with comfort and stand up under the hardest of hard service.

Write Today For FREE CATALOG

G. H. BASS & CO.

1000 Main Street

Wilton - - Maine

DEALERS: **There may be a Bass franchise open in your vicinity. Write today for full information.**

(Continued from preceding page)

pass through the hands of the clerks in charge of these stock cards, so that the proper additions and subtractions can be made, and orders can be placed for new materials when the stock reaches a specified "low limit."

Hand in hand with the stockroom must go the cost accounting department, which is concerned not only with material requisitions against specific planes, engines and jobs, but also with labor charges against those units. The Pan American cost department furnishes regularly to the divisional engineer exact figures on the maintenance and overhaul cost of each airplane and engine in service, as well as on special jobs done in the shop for outside customers, inventory and permanent equipment. The divisional engineer regards these data as of prime importance to him in the economial control of his maintenance system.

The first few paragraphs of this article outlined the general *plan* upon which the Pan American maintenance system is bsade. The middle paragraphs showed briefly how this plan is *executed* from day to day. No plan of this kind, however, can be successfully carried out over a long period of time without continual, skilled and vigilant *control*. Therefore, these concluding paragraphs will sketch a few of the ways in which the system is kept under control.

The first essential is the supervision of trained, conscientious engineers, and of their important aides, the inspectors. To them must go for solution problems of structural repair, abnormal engine performance, unusual aerodynamic characteristics, and the many similar problems which require prompt and skilled judgment if danger is to be forestalled. Data on these problems must come from the pilots, from the inspectors, and from carefully kept records of engine performance, fuel consumption, and the like. The importance of keeping on file detailed "life histories" of each airplane and engine cannot be overestimated. Such data must include pilots' flight reports, inspection reports, fuel consumption data, engine test logs and airplane flight test logs.

To assure control of individual workmanship, the system of requiring personal signatures for work completed proves successful, in that it definitely places responsibility on specific employees. If an error is detected, it is almost invariably possible to go directly to the employee at fault in order either to educate or to discipline him as the case may require (the former is usually much the more desirable).

Since the final criterion of any airplane or engine work is an adequate flight test, it is a rigid rule that all changes or repairs on airplanes or engines require a flight test before the ship is put into regular service.

The fuel used in aircraft engines has a direct and important effect on both safety and efficiency, as is well known. In order to control the quality of the fuel supplied to Pan

(Continued on next page)





CUSTOM
FINISH
TRI MOTOR
AIRCRAFT



BACH AIRCRAFT COMPANY, INC.
VAN NUYS, CALIFORNIA

(*Continued from preceding page*)

American planes over many thousands of miles of airways in foreign countries, a complete laboratory is established in Miami. It is equipped to make not only the routine tests prescribed by the American Petroleum Institute, such as gravity, corrosion, gum and distillation tests, but is also equipped with the latest model of knock-rating engine to determine the detonation characteristic of each sample of fuel. Specimens come to the laboratory regularly from each station in the system. Tests are promptly run. If any deviation from standard specifications is observed, the use of that particular batch of fuel is immediately stopped. It is to the credit of the refiners supplying aviation gasoline that they have coöperated in developing laboratory equipment of this kind, and then have so improved their product as to make any deviation from specifications comparatively rare.

BUILDING AN EXPORT MARKET

(*Continued from page* 80)

crosstie figure. We follow the railroad to Lima. Then do a little rapid figuring: We suppose the copper can be reduced at the mine and only the pure copper of commerce will be sent to market. It would cost more to get the copper to Lima than it is worth, even supposing the cost of mining and milling were nothing at all.

The map would tell the whole story of geography, topography, transportation, agriculture, mining and fisheries. Then there are the statistical reports with their "ifs" and "buts."

The map and the accompanying reports would show how many people in the market (estimated); how much money they have (estimated); how many of them can read, if so, how much and, if not, why not; what they do for a living.

A half dozen typewritten pages would be devoted to the wealth and buying power of Colombia, for instance. It is misleading to say the total national income is so much and there are so many people, hence we have an average income of so much. The truth that the advertiser or exporter should be told is that the national income is so divided that sixty per cent of it is distributed among ten per cent of the citizens. These (the ten per cent) have plenty of money to buy your product if you can teach them to want it. Those in another forty per cent haven't too much money but under certain circumstances could also buy your product. The remaining fifty per cent cannot be considered as prospective customers, at least not this season, but the resources of the country are so great and are being developed so rapidly that the fifty per cent who can't buy now may be your best customers ten years hence. Keep an eye on them!

Then a short history designed to show why the people of your market are what they are, why they have certain prejudices, even as you and I; what their racial strain is and how it may influence your program. What about the climatic conditions? This market is near the equator, but nevertheless along about the fourth of July it gets extremely cold in the Andes. And remember, too, that the seasons are reversed south of the equator.

When you study your relief map and spend a few minutes with the typed sheets that accompany the map, you should have the story of Juan Colombo or Pablo Argentino or whoever it is you are studying. You know so much about these interesting gentlemen that they, if they were told about it, would be surprised and perhaps a little disconcerted.

(*Continued on next page*)



Standing Up Landings ~ ~ *four times out of five*

RALPH LA PERE has jumped parachutes for some time—and most of the time he has landed hard . . . uncomfortably hard. Then he tried a Hoffman Triangle Chute . . . not once, but five times . . . and four times he landed exactly as the pictures show.

To achieve such landings, it was necessary to make a chute that did not oscillate, was steerable and had a low rate of descent. These three factors were imperative. Without them the jumper is at the mercy of hard falls, backward landings, and even injuries due to oscillating contacts.

The Hoffman Triangle Parachute has numerous additional features: it opens rapidly, yet exerts a low shock; its strength is phenomenal . . . having functioned perfectly with weight equivalent to that of 8 men at eighty-five miles an hour without showing a trace of failure.

When flying you hardly notice the chute. Its harness is light and comfortable, yet very strong, and slips on as easily as a vest. Its fasteners and fittings are of Alleghany stainless steel . . . small, neat and easy to adjust. For exhibition jumps, a back pack (28 ft. parachute) can be attached to the regular 24 ft. seat pack equipment and removed after the jump . . . a feature which is extremely popular.

If you are uncertain about parachutes, write for 24-page booklet, "What to Look For When Buying a Parachute and Why," by E. L. Hoffman. Ask about the easy payment plan.

Special Announcement: A Safety Belt by Hoffman—warns when accidentally undone, twice required strength, always reachable, quickly adjusted, instantly releasable yet difficult to inadvertently open, parks out of the way when not in use—is ready for the market.

If you do not have a parachute when you really need one, you will never need one again.

E. L. Hoffman

The TRIANGLE PARACHUTE Co.
GLOBE-WERNICKE BUILDING, CINCINNATI, OHIO

Say you saw it in AERO DIGEST

Talking About Speed!

BY

E. B. GALLAHER

Treasurer, Clover Mfg. Co.

Editor, Clover Business Service

You know, rabbits *think* they are some runners; but, when the colored Deacon, walking through a graveyard one dark night, was startled by a white object jumping out at him, he started to run down the road—Mr. Rabbit right in front, but not going fast enough to keep out of the way, the Deacon yelled out, "Git one side there and let a fellah run w'at KIN run."



I can't help getting a good laugh at the expense of the bunch who have been yelling their heads off about the alleged "speed" of certain water-mixed valve compounds, and the "passing" of grease mixtures; **for, now come the long-awaited Government findings and specifications, dated May 1st, 1928, governing future purchase of abrasive compounds and knocking all this bunk into a cocked hat.**

The Government, after months of laboratory work, finds (1) **that the fastest cutting compound is a grease mixture, which cuts 3 7/10** times faster than any other; (2) that the cutting speed is entirely dependent on the quantity of **truly graded** grains; (3) that the grease binder is so superior to the water-mixed binder that (4), **in the future only grease-mixed compounds will be used, and no water-mixed compounds will be bought.** Going some? But, after all, it is quality that always decides in the end.



If you haven't used the latest developments in Clover Grease-Mixed Grinding and Lapping Compound, you had better get next—**we** have always known there was nothing faster—a million mechanics will tell you that quality of work cannot even be approached with anything else.

You might as well have the best—costs no more.

Glad to send you samples.

Gallaher

CLOVER MFG. CO., NORWALK, CONN., U. S. A.

SINCE 1903

SAND PAPERS
METAL CUTTING PAPERS AND CLOTH
AUTOMOBILE NICKEL PASTE
METAL POLISHES

CLOVER GRINDING AND LAPPING COMPOUNDS

E. B. GALLAHER:
Clover Mfg. Co., Norwalk, Conn.
Send Samples

Clover GREASE-MIXED Grinding and Lapping Compound . . .

Name

Address

Character of Business

Faultless Vision

with all day flying comfort



THE WILLSON PILOT GOGGLE

THE wind that forces its way under the padding of ordinary goggles and gives the flier "crying eyes" cannot penetrate the sealed air-tight contact which this channel-shaped, pliable rubber mask creates. Only slight headband tension is required to give this sealed contact, and thus the wearer is relieved from discomfort and any tendency toward sinus trouble caused by undue pressure on sensitive parts of the face from excessive headband tension.

While flying, air is forced through the venturi tube (on top of each cup) which partially exhausts the cup interior and so eliminates lens fogging.

Each lens affords a lateral range of vision of 135° and their surfaces are ground with a precision that permits of no image distortion. This frees the flier from those headaches which usually come from eye-strain during prolonged periods of goggle wearing. These Goggles meet the rigid new U. S. Navy Specifications.

The workmanship, appearance, and performance of the Willson Pilot Goggle leave little to be desired.

PRICE

with clear glass $20.00 *per pair*
with tinted glass 23.00 *per pair*

WILLSON PRODUCTS, Inc

READING, PENNSYLVANIA

U. S. A.

(*Continued from preceding page*)

But however clever and complete the map and the data may be, there is still a lot to learn. Before one is justified in spending his money or his firm's money, he should observe and understand a thousand and one trifles. Acquaintance with and appreciation of these trifles determines whether or not an export organization will succeed.

The next matter to be considered is the preliminary or introductory advertising. This involves or should involve the careful study of advertising appearing in foreign publications. Then it must be determined whether or not the advertiser whose work is being studied, is getting good returns from his advertising. It is the common practice to study and compare the advertising of American firms, of Europeans and the natives. Advertising must be judged by results. Let's not be too hasty in criticizing the crude work of the natives. This is a very common mistake. Quite frequently advertising that is described as terrible is getting results, whereas the work of the best copy-writers and artists fails.

There are very few publications in the frontier countries that devote any considerable space to aviation. The advertiser must select such publications as have the largest and most influential circulation among prospective purchasers of airplanes. One may, of course, either advertise in a native publication or in a periodical published in the United States for distribution in Spanish-American countries.

There are wide differences of opinion in the matter of selecting salesmen. A considerable number of good firms have decided that their sales force shall go native. Others use only men from home. The native has certain advantages if he is a salesman. It is conceded that the man from home is a salesman or he would not be sent to the foreign market. He must be much more than a salesman. He ought to be an adventurer. He cannot be judged by the usual standards. The fact that Jones worked faithfully for fifteen years in the Chicago territory of "Blank and Co." is no reason for adding him to the sales force in Brazil. To the contrary, Jones' good record probably disqualifies him for a job abroad.

A group of Yankee salesmen at a hotel in Buenos Aires offered an interesting study. One was past fifty and was a member of the firm he represented. He sold hammers, hatchets, axes, etc. This gentleman's total sales for that trip amounted to less than his expenses. Another represented several firms on a retainer basis. His income was very satisfactory until his employers began to realize that he wasn't selling anything. The "Paris of the New World" offered many attractions to a man from the States with a thousand a month to spend. This man could have made good if he had attended to business. He was later sent home by the United States consul.

The other members of the group were making good, or at least getting by. They all spoke Spanish. Most of them also spoke French. None of them had made a record for sticking to it. The most able of the group described himself and the others as good tramps. "We are more intelligent than the genus hobo who rides in a box car, but we have the same instincts. I am never satisfied in the United States because I feel that I belong there and I don't like it. Here are people who don't speak my language nor eat my food. I enjoy every minute I spend with them. I wouldn't trade jobs with any man on earth."

That type of export salesman is effective; he is energetic, tolerant and badly bitten with a stimulating curiosity.

It's hardly advisable to send any one-trippers to the

(*Continued on next page*)

Announcing UNITED GLIDER CORD

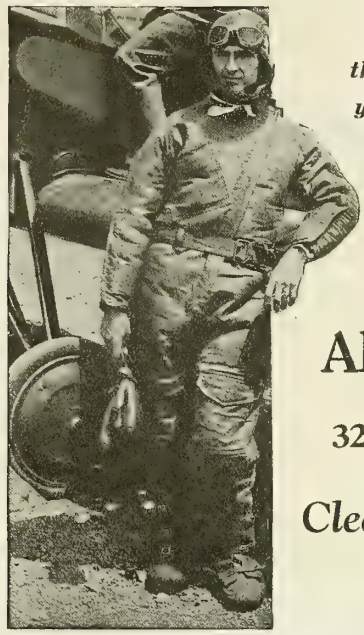


GLIDING is the greatest sport of the year. Get out on your airport and try it. With a smooth flowing rush of elastic power United Glider Cord will take you aloft easily, thrillingly, safely.

Specially manufactured and specially priced for launching gliders. Sizes ½, ⅝, ¾, and 1 inch. We ship the same day.

Write or wire.

UNITED ELASTIC CORPORATION
Manufacturers of Elastic Fabrics
Elastic Cord Dept., Easthampton, Mass.



You *are the eyes of your ship!*

27,250 Foot Altitude

32° Below

Clear Vision

with

"AMERICAN TRANSPORT"

On February 16th Barney Zimmerly created a new light plane altitude record of 27,250'. The temperature was 32° below zero. Zimmerly says his *American Transport* goggles (worn on this flight) are the finest aviation goggles he has ever worn. *They did not fog or blur!*

NON-FOGGING! VENTILATED!

SUN PROOF!
(Calobar)

NON-BLURRING! RESTFUL!

American Transport Goggles are ventilated behind the lenses. There are no air leaks—no direct air needles. Lenses of greater precision eliminate eyestrain, displaced images and "goggle headaches," making for greatest possible safety. ***They have been tested, approved and adopted by the U. S. War Department Air Corps.*** All parts removable and replaceable with the fingers.

RED WING FLYING SERVICE, Inc.
DISTRIBUTORS

Order your American Transport Goggles with glare-proof Calobar Lenses that shut out glare but show colors in their true value. With Calobar Lenses, $24.00; with white lenses, $20.00. Special discount to dealers and schools.

RED WING FLYING SERVICE, INC.
WARE, MASSACHUSETTS.

Enclosed ☐ $24 ☐ Calobar Lenses } American Transport
☐ $20 Send prepaid ☐ White Lenses } Goggles

Send more information on AMERICAN TRANSPORT GOGGLES.

NAME.....

ADDRESS.....

IF IT'S A



GASKET

that's needed

THINK OF · · · · ·

VICTOR



VICTOR MFG. & GASKET CO.
5750 Roosevelt Road .. Chicago
WORLD'S LARGEST GASKET MANUFACTURER

distribution of airplanes is now effected through a new representation plan unlike any other . . . full particulars upon request.

spartan aircraft company
tulsa okla.

(*Continued from preceding page*)

export market. They usually do more harm than good. A one-tripper is often related by marriage or some other mistake, to the big chief. He goes to the Orient or South America and does the wrong thing and does it right. He usually oversells his product, then comes home and poses thereafter as an authority on export trade. His remarks are always prefaced with "Now when I was in South America."

The one-tripper is no good to himself nor to his firm, and is a positive menace to his countrymen who are in the export market to stay. We Americans are judged as a group rather than as individuals. If an American is guilty of sharp or crooked dealing in the foreign market, all his fellow countrymen must suffer for his sins.

I have met salesmen from Europe who were everything a man and a gentleman ought to be. Others undertook to eliminate Yankee competition by circulating false statements about the goods made in America and about Americans as a nation and as individuals. The business of meeting this situation involves diplomacy of the highest order. It is not good form to punch the propagandist on the nose. He probably regards his stunt as perfectly legitimate and would not be offended if you should employ the same tactics.

A sales organization is not designed to deal solely with conditions as they are. The man with a sales problem (and that includes most of us) must look into the future—must undertake to see conditions as they will be five or ten years hence. In export even more than in domestic trade, one must build for tomorrow. Business proceeds more slowly abroad than in the land of the hustling Yankees. Five years is the time usually required to build an efficient export organization. The coming of the airplane and of radio may serve to cut this time in half, but even then the exporter must deal in futures.

An analysis of the things that are sometimes persuades the prospective exporter to turn away from what is destined to be his best market five years hence. The superficial student of statistics often acquires misleading information.

We must remember that undeveloped countries will skip certain stages of development through which the older countries have passed. In Bolivia, for instance, it is a case of going from the most primitive to the most modern. Literally from ox-carts to airplanes.

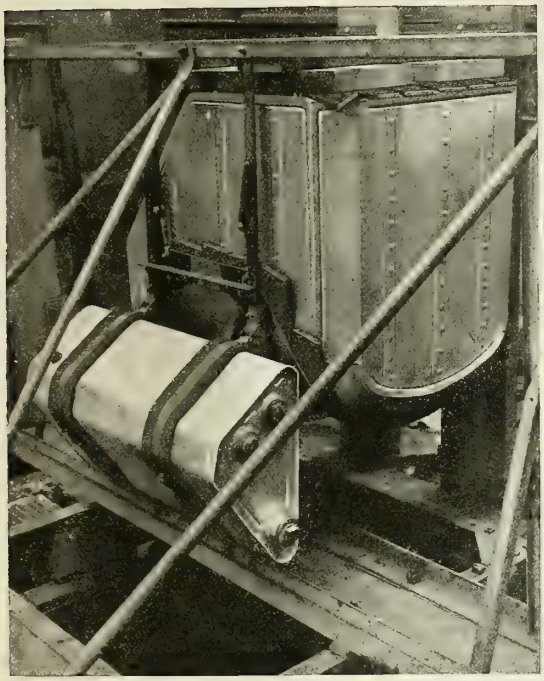
An officer of the Bolivian army says, "Aero Lloyd Boliviano, as well as military aviation, has shown great enterprise and there are services to every part of the country with headquarters at La Paz. A school for pilots has been organized since 1928 besides the Military Aviation School at La Paz. The state contributes handsomely toward the expense of the air service."

There are very few places in the world of today that may not be regarded as potentially profitable markets for aircraft. Statistics dealing with the present wealth and population of frontier countries often serve to discourage the prospective exporter, but in this day of rapid change, it is not wise to base a policy on statistics.

Europe and the United States need export markets for products of all kinds. This need is the greatest civilizing influence at work in the world of today. Because we must have markets, the people of rich but hitherto neglected sections will be afforded the opportunity to better their conditions.

The United States has a great deal of surplus wealth that seeks employment in basic and profitable industries. The existence of this unemployed money makes almost any country in the world a potential market for aircraft.

TANKS



The PARAMOUNT Navy-Standard Vibrator Shock-testing Boeing tanks . . . . PARAMOUNT-built for Navy planes.

ARE NOT TESTED WITH A YARDSTICK

When government officials start testing fuel and oil tanks with a *yardstick* . . . then, and *then only* will it be safe to buy your tanks on the basis of cost per cubic foot. ¶ Year after year, PARAMOUNT TANKS have run the gauntlet of severe vibration tests . . . pressure tests . . . break-down tests . . . trail-blazing *performance* under unusual handicaps. ¶ PARAMOUNT craftsmen have learned how to *make tanks better.* PARAMOUNT standards have been rigidly maintained through the years for your protection. ¶ That is why firms like Chance-Vought . . . Loening . . . Consolidated . . . Curtiss-Robinson . . . Thomas Morse . . . Bellanca and others equally prominent have found it worth while to specify PARAMOUNT TANKS.

MEET US AT BOOTH 146 AT MADISON SQUARE GARDEN

PARAMOUNT

WELDED ALUMINUM PRODUCTS CORP.

195 MORGAN AVE., BROOKLYN, N. Y.

PARAMOUNT TANKS ARE BETTER

THE safest airplane is finished with PERRY-AUSTEN DOPES

THE Curtiss Company used Perry-Austen Dopes on the first airplane it built, years ago . . . and also on its newest, the "Tanager." Curtiss engineers have experimented with every dope on the market in a search for the finest products for Curtiss planes. They chose Perry-Austen Dopes on the strength of quality. These dopes do not crack, peel or rot; they provide good take up and fill; are easy to apply and dry with an unusually smooth and glossy surface. It was natural, then, that Curtiss-Wright specified "Perry-Austen" for the winner of the Guggenheim Safe Aircraft Contest.

PERRY-AUSTEN MFG. CO.

MAIN OFFICE AND WORKS:

Grasmere, Staten Island, N. Y.

Telephone: Dongan Hills 707

The CURTISS



TANAGER

AERONAUTICAL CHAMBER OF COMMERCE

CHICAGO OFFICE
510 N. Dearborn St.

TELEPHONE
Superior 6948

AMERICAN PROPELLERS

Efficient—Durable—Inexpensive

OX5-OXX6 supplied with built in wood spinners, less aluminum spinner caps for Waco, Travel Air, Swallow, Commandaire, Lincoln-Page, Eaglerock, American Eagle, Challenger, Pheasant, Stearman, each ..... $45.

Less built in wood spinner and aluminum caps ..... $40.

Hispano Suiza—150-180 Hisso American, less built in wood spinner..... $55.

PLYWOOD

We have a most complete stock of AN-specification waterproof plywood for immediate shipment. Carried in stock in following sizes: Birch or Mahogany.

24 x 48	36 x 48	48 x 48
24 x 60	36 x 60	48 x 60
24 x 72	36 x 72	48 x 72
24 x 84	36 x 84	48 x 84

1/16"	$0.32	5/32"	$0.35
3/32"	.32	3/16"	.36
1/8"	.32	1/4"	.38

Crating charge: Is same for 1 sheet or more, charge 5c per square foot based on largest size sheet of shipment.

LIGHT WEIGHT HELMETS

Scully No. 97—Cordovan Cape, lined with glove silk, seams leather taped..... $5.50

Scully No. 90—Cordovan Cape, summer weight, unlined $4.50

N. B. Army No. 5—First quality chamois, unlined, an excellent summer helmet... $4.00

N. B. Commercial No. 7—Unlined bleached cloth; cream, white, tan, grey, (specify color) light weight, each $1.50

LIGHT WEIGHT FLYING SUITS

Ground Mechanics' Suits—White or Khaki herringbone cloth, button front, ankle and wrist straps, belted, large pockets, aviation emblem on left breast, per suit, sizes 36 to 44..... $4.00
(Sizes 46 to 50—10% additional)

No. 2086 Whizit Flying Suit—White or Khaki herringbone cloth; zippered front neck to crotch; adjustable tabs at ankles and wrists; large map pockets with button locks; convertible lapel collar, per suit, sizes 36 to 44 ..... $7.50
(Sizes 46 to 50—10% additional)

LETTERING—$.50 per suit additional, if amount of wording is not too heavy.

OX5 PARTS

Our stock of OX5 and OXX6 parts is ocmplete in all respects. New low prices are in effect. A few new parts here and there on your motor will increase its efficiency wonderfully. Prompt delivery is assured because of COMPLETE stock.

CATALOG "H" Is Ready
Do You Have Your Copy?

(Parts & Supply Division)

Nicholas-Beazley Airplane Company Inc.
Marshall • • Missouri

Western Branch: 3769 South Moneta Avenue, Los Angeles, California

REASONS MOST AIRLINES DON'T PAY

(*Continued from page 78*)

the accident. It is their duty to get the story. Thus, unless reporters are helped by officials of the company, an extremely harmful story may result. Elements of mystery instil a feeling of danger. Remove this feeling of the unknown and danger is erased.

The inconvenience of taking a bus or taxi to and from the airport is also an obstacle with which traffic representatives have had to contend. Prospective passengers object to this expedience, especially in the case of short air trips. The prospective passenger asks: "Why should I pay you an extra rate to carry me by airplane? You save me hardly any time. It takes thirty to forty-five minutes to travel out to the airport to your plane. Your ship, you say, makes the trip in two hours. Then there is an additional thirty to forty-five minutes required to travel from the airport downtown at the other end. That is a total of over three hours, and I can make the trip by train, at a lower rate and without the inconvenience of transferring from bus to plane and plane to bus, in slightly more than three hours."

Regardless of how enthusiastic we may be about air transportation, that is one argument we cannot hope to win as long as the majority of companies employ the facilities provided at present. One solution now available for solving that problem is the amphibion plane.

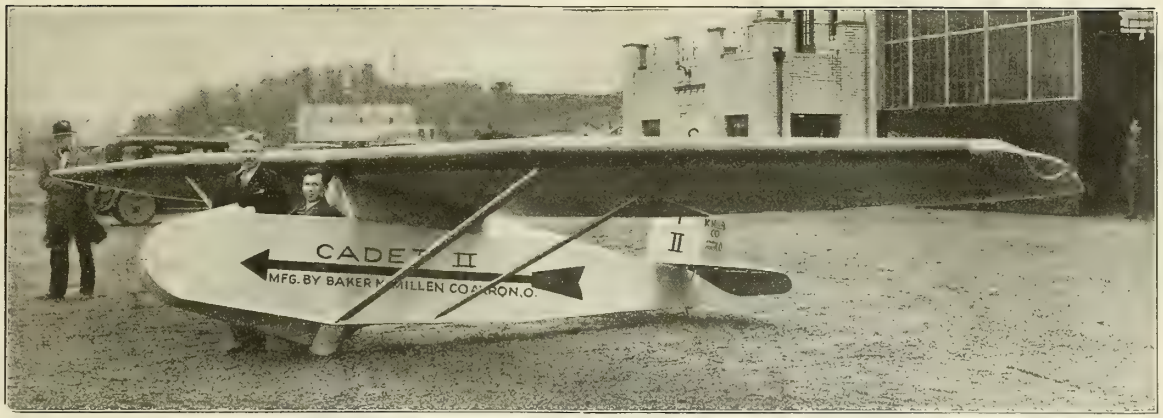
In spite of its advantage it is an undeniable fact that an amphibion line in northern country can operate only seven or eight months out of the year, because of ice forming on the water. Of course an amphibion line is not alone affected by weather conditions, for the regularity of service on many lines is seriously affected during several months of the year. Unreliable schedules plays no small part in holding down the patronage of airlines, but because fog is the flier's most feared enemy, it is better to fly safely than to try to maintain on-time service. Instruments and equipment are being developed that will, it is hoped, soon enable operators to overcome the handicap of weather, but until these aids are perfected and in general use, airline operators must be hyper-cautious about bad weather flying.

Frequency of schedule is an important factor in building up passenger traffic, especially on short trips. There are also times when a frequent schedule would help lines which operate greater distances. For example, one may wish to travel by air from Cleveland to Chicago, but because planes leave the Ohio city infrequently and because he cannot get one at the time he wants, the prospect goes by train.

Lack of coördinated traffic solicitation has in the past had a retarding effect on the growth of air passenger traffic. In not rare instances traffic representatives of various lines, unknown to their superiors, have made disparaging remarks about lines operating in competition with their company. For instance, statements have been made implying that the ships of another line are not as safe and reliable as their own. As a result, doubt as to whether any form of air travel is safe has undoubtedly arisen in the minds of their listeners.

Twenty-two leading air mail operators have organized and are contributing to the support of the American Air Transport Association, the purpose of which is to release to papers and magazines throughout the country news stories and articles on the subject of air mail and its uses. The association's offices also act as a clearing house for ideas for soliciting and building up air mail poundage. Among air passenger lines a similar organization, or corresponding

(*Continued on next page*)



FLY A GLIDER *that looks and handles like an airplane . . . .*

The new Baker McMillen Training and Soaring Glider has won for itself the admiration of all glider enthusiasts. It is a machine which may be taken to glider contests with the confident expectation that it will make a splendid showing. The pilot in looking over the cowling of the enclosed cockpit can tell instantly the stability of his machine.

SPECIFICATIONS: High wing monoplane. Welded steel fuselage. Tapered wings. Span, 37'8". Length, 18'9". Weight, 230 lbs. Angle of glide, 15-1. Sinking velocity, 3½' per sec. Landing gear, 16 x 6 air wheel and brake. Tubular controlled ailerons. Fittings cadmium plated. Finish gold and blue, 55 yards ⅝" rubber shock cord. Special hook for either shock cord launching or towing. Price $650 complete, plus crating. We solicit inquiries from responsible parties who wish to handle our machines. Write or wire.

THE BAKER McMILLEN CO., AKRON, OHIO *Established in 1874*



MARSHALL Flying School

Announces NEW, Lower Prices!

Unlimited Solo Flying, $7.50 Hour

In keeping with its position as America's foremost flying school, Marshall now takes the initiative in making aviation training available to everyone.

We are expanding all our courses—making them more complete—and at the same time announcing LOWER PRICES for the instruction offered.

For instance—our 10 hour Flying Course is now only $175.00!

And our Primary Aviation Course has been expanded to include *twenty* hours in the air—and a seven weeks mechanical course—for only $350.00.

Nowhere else will you find such thorough, competent instruction at such *sensible prices*. Every Marshall Flying student receives instruction in the sensational Barling NB3 monoplane—holder of two world records. Living expenses here are cheap—surroundings ideal.

Mail This Coupon Today

MARSHALL FLYING SCHOOL, INC., 150 English Street, Marshall, Missouri

Please send information on your new courses and new prices.

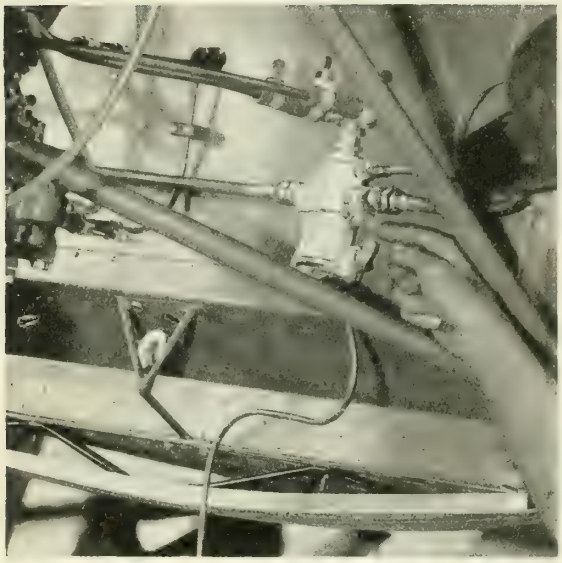
NAME .....

ADDRESS .....

Say you saw it in AERO DIGEST

LUNKENHEIMER
AIRCRAFT SPECIALTIES

ALUMINUM
FUEL
STRAINERS



MADE IN 1/4" AND 3/8" PIPE SIZES
FOR ENGINES UP TO
500 HORSEPOWER

THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO BOSTON PHILADELPHIA
PITTSBURGH SAN FRANCISCO LONDON
EXPORT DEPT. 318 322 HUDSON ST., NEW YORK

38-26-2

THE LUNKENHEIMER CO. "QUALITY" P. O. Box 876, Cincinnati, Ohio

Gentlemen:

Send me a copy of Lunkenheimer Aircraft Specialties Catalog No. 3.

Name_____

Firm _____

Position _____

Street _____

City_____ State _____

(*Continued from preceding page*)

coöperative effort, would benefit all.

Once an individual is convinced of the advantage of air travel, he becomes a potential patron of all airlines. Consequently, a unified, rather than a disjointed, effort to build up passenger traffic would work to the best interests of all.

The American Automobile Association, through the Air Travel Ticket Offices established at its various branches, has in some cities done more to coördinate passenger solicitation than have the operators themselves. The automobile clubs deserve much gratitude from the operators for the services they have performed.

Yet there is one vacant, but necessary, gap which no outside organization can fill for the operators—namely, providing more satisfactory facilities for handling passengers at the terminals such as restaurants, rest rooms, proper care of baggage and so forth. Recently we made an inspection of a number of airports and airline terminals throughout the Middle West and South to study conditions. We found that, at some airports, little thought had apparently been given to providing comfort for passengers. Some passengers with whom we talked were displeased with the manner in which their baggage was handled; others objected to walking through mud to get into planes. True, there are not now many companies which are not striving to correct these conditions. But the few that are still careless about them injure all the rest. Notwithstanding the facilities that are provided for passenger handling, our lines in the United States suffer by comparison with those in Europe, and persons who have used the foreign lines are inclined to criticize the systems in this country.

The real crux of the problem of why airlines do not pay, in my opinion, lies in the fact that no air transport operator can succeed if he depends on passenger traffic alone, except in rare and unique instances. It is said that the railroads operate their passenger trains at about forty per cent capacity. This figure is, of course, not accurate for specific systems and routes, but it tells a story, especially when one considers that the railroads of the United States obtain sixteen or seventeen per cent of their income from passenger transport. The airlines carrying passengers have been operating at from sixteen to thirty-two per cent capacity.

I am convinced that the transport operators who are endeavoring to build their lines on a foundation of passenger traffic alone are, except in rare instances, proceeding inversely. It is a known fact that human cargo is the most costly to handle. The histories of nearly every modern form of transportation, with the exception of ferry boats, street railways, taxis and the like, show that the greatest volume of revenue is derived from freight, express and mail.

The air transport operators should exert every effort toward building up freight business if they wish to place their lines on a paying basis. By freight I mean mail, express, baggage, perishable goods and other merchandise which is valuable and should be moved quickly. The economic reasons underlying this belief appear sound. It would be cheaper to carry 2,000 pounds of freight 300 miles at a rate of ten cents per pound than it would be to carry twelve passengers the same distance at $20 per passenger—if both planes were designed for their respective cargo along the lines of construction now used. (The rate of $20 for 300 miles is almost equal to train-plus-Pullman rates for the same distance.)

The demand for the transport of goods by air would be almost unlimited if the rates were low enough. And they

(*Continued on next page*)

KINNER
AIRPLANE ENGINES are RELIANCE tested



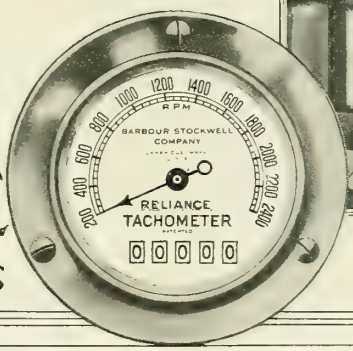


In building airplane engines . . . and in testing . . . Kinner standards of practice are exacting and thorough. You will find Reliance Tachometers on every Kinner Test Stand.

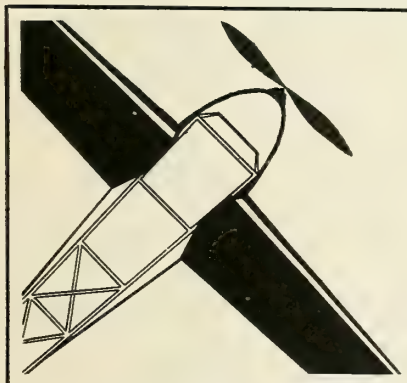
49 airplane manufacturers powered their planes with Kinner in 1929 . . . convincing evidence that it pays to *know* the motor is sound!

Write for booklets F. 10 and D. 11.

BARBOUR STOCKWELL CO.
CAMBRIDGE, MASSACHUSETTS



RELIANCE
REG. U. S. PAT. OFF.
TACHOMETERS



SEAMLESS STEEL TUBING

The final safety of all aircraft is absolutely dependent on the *uniform* strength of the frame.

It is significant that a growing number of companies use Service Seamless Steel Tubing exclusively for this purpose.

All Aircraft Grades

WAREHOUSE STOCKS for immediate shipment in any quantity.
MILL SHIPMENTS for substantial production requirements.

SERVICE STEEL COMPANY

19 SCOTT ST. BUFFALO
32 E. FRONT ST. CINCINNATI
1435 FRANKLIN ST. DETROIT
216 N. ALEMADA ST. LOS ANGELES



Incredible!
YET TRUE!

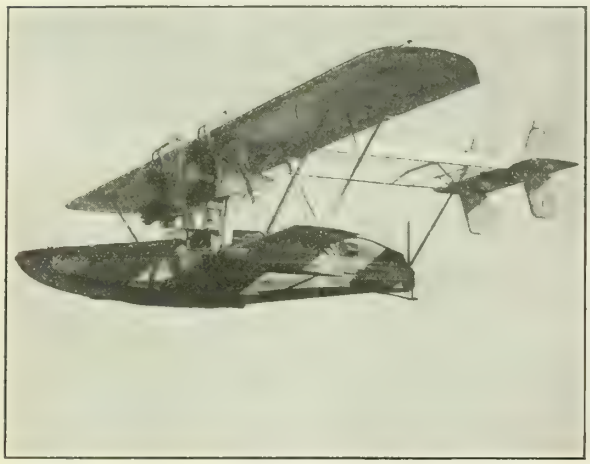
The above is an unretouched photograph of the "Rhon Ranger," primary training glider by MEAD GLIDERS, carrying *two men*, after a launching from level ground with ordinary 5/8" shock-cord.

This supreme training glider may be purchased as a construction set, complete from nails to dope, for $89.50 F.O.B. Chicago, or ready-to-fly for $445. Send 10c TODAY for interesting literature, with many photographs of the "Rhon Ranger," and affidavit of witnesses to the above flight.

MEAD GLIDERS
Dept. A 12 So. Market St. Chicago, Ill.

Say you saw it in AERO DIGEST

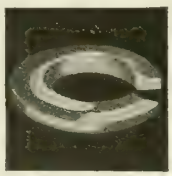
INDISPENSABLE





LOCK washers are a small part of aircraft and engine hardware, but the very fact that they are indispensable in construction is sound reason why only the best should be used. Leading manufacturers order **Hobbs Lock Washers** every time because they recognize and demand quality.

HOBBS Lock Washers are manufactured in S. A. E. Standard, Commercial and Special grades, in all kinds, sizes and types. They are obtainable in any quantity on short notice and in boxed assortments. We will be pleased to submit samples and prices on request.



HOBBS MANUFACTURING CO.
WORCESTER, MASS.

Not Members of Any Combine

(*Continued from preceding page*)

can be brought down to a reasonable level, as illustrated by the example above. A man will ship his goods by air when he will not himself travel by airplane, nor permit his family to do so.

There are 39,000,000 pounds of "premium freight" carried by railway express companies each day. Much of this would be sent by air if the rates were reasonable, and it would not take a great volume to pay for the operation of quite a large fleet of planes.

The problem to be solved in the transporting of goods or freight is the pick-up and delivery of parcels. Many operators have been trying to solve the problem by coöperating with the Railway Express Agency, Inc. But that solution has proved unsatisfactory because of the prohibitive charges the express company has been forced to make in order to cover pick-up and delivery costs.

Air transportation will not realize its potentialities until we eliminate the problem of reducing freight and express rates and concentrate on carrying this form of cargo. The desirability of lowering rates for carrying goods by air cannot be stressed too strongly.

We have ships today that will carry a ton of freight for one-fifth the cost of carrying twelve passengers. Moreover, it is possible safely to maintain schedules with freight when it would be extremely hazardous with passenger equipment.

We must have regularity of schedule before air transportation is successful. We must be able to operate planes twenty-four hours per day every day in the year, with great frequency, carrying full loads at the lowest possible rates. This can be done only by carrying goods in equipment that is designed to carry the maximum load at a minimum of horsepower, keeping in mind, of course, the safety of the pilot.

With the aids in navigation we have today, it is possible to maintain a more regular schedule with freight than with passengers. The transportation of freight by air is the answer to our problem of making the airline pay. For freight is, and will be for a long time to come, the backbone of nearly every form of transportation.

CREDO OF THE SERVICE PILOT

(*Continued from page 72*)

That all student officers above the lowest rank are after the extra money in aviation.

• • •

That no flight officer detailed at Washington likes to fly but does so because he has to.

• • •

That flying in polar regions must be great fun—for the other fellow.

• • •

That endurance flying is spectacular, boring, good publicity, dependent mostly on luck, and as futile as riding on a merry-go-round with one other passenger.

• • •

That what this country needs is a unified air service.

• • •

That under no circumstances should the country have a unified air service.

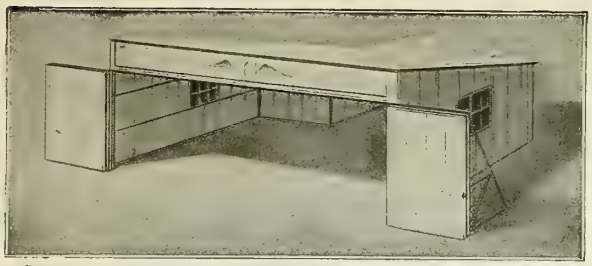
• • •

That air power will be the dominating influence in the Pacific, but who gives a hang?

• • •

That the proposed reduction in Federal expenditures will fall most heavily on the air services as a sop to the pacifists, but that all other nations, having sense, will increase their aviation appropriations.

(*Continued on next page*)



EDWARDS
Individual Hangars
For Private Planes

Edwards Individual Hangars are built throughout of steel and shipped complete, ready for immediate erection.

Simple in design and rigid in construction, these hangars provide positive, permanent protection from fire, lightning, wind and weather and from carelessness of unauthorized use in public hangars.

We also make a complete line of garages, oil and filling stations, warehouses, large hangars, etc.

Write for prices.

THE EDWARDS MANUFACTURING CO.
345-395 Eggleston Avenue, Cincinnati, Ohio

AVIATION Is Calling for More TRAINED MEN

Here's your opportunity to gain success, fame, and fortune. The industry needs trained men to design, stress, and supervise the construction of planes; to lay out and manage airports.

Here's your Opportunity to get started

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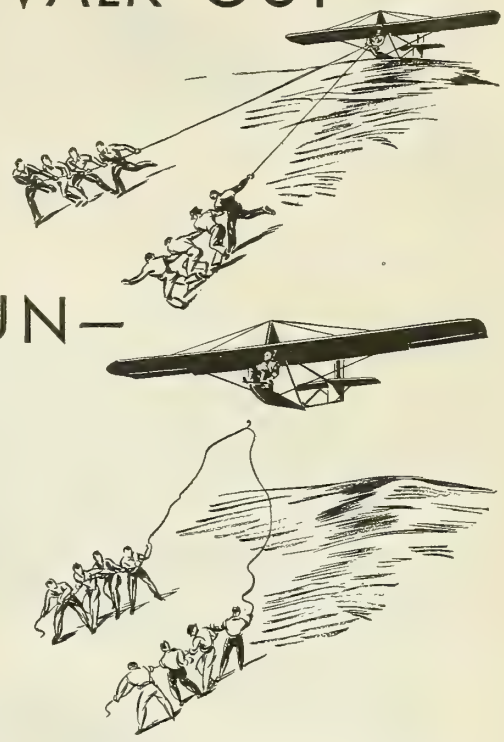
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Up you fly—high above the heads of the ground crew—the launching rope drops from the glider. You push the stick forward slightly, nosing the ship down—then begins the swift, thrilling "toboggan slide" back to earth. Breathlessly you rush through the air . . . the keel skids to rest 700, 800, or 1,000 feet from the starting point. Immediately, you want to take another flight!

The Detroit Gull is designed and built to meet the requirements of the Department of Commerce and to stand up under the hardest abuse. It is so staunchly and ruggedly constructed that if a student on his first solo flight "stalls" and makes a bad landing, no damage is done.

It's easy to form a glider club — today everyone is interested in this new sport of gliding. Organize a group of twenty to twenty-five members and purchase a Detroit Gull—each need contribute only $25.

The **DETROIT GULL** **$485**

We cordially invite you to write for glider club information and our illustrated folder on the Detroit Gull.

GLIDERS INC., Division of

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Streamline design . . . lets the wind go by.

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(Continued from preceding page)

That any two pilots together talk shop incessantly to the exclusion of all else, and that when a strange service pilot drops in to another service field, the mutual cross-questioning never ceases.

• • •

That all autobiographical books by famous airmen are written by ghost writers.

• • •

That low-wing monoplanes of foreign design and manufacture possess desirable features impossible to duplicate in their own airplanes.

• • •

That a pilot's value to aviation should be measured by his experience in the air.

• • •

That most aviators are estimated by the public on the basis of the amount of space wangled for themselves in the newspapers.

• • •

That all commercial aviators save large sums of money by being given free gas and oil in return for advertising on the plane.

• • •

That commercial airline operators make all kinds of money.

• • •

That most aeronautical magazines have too little to say about the air services.

• • •

That the granting of contracts to bidding aircraft and engine firms is determined beforehand by Government officials according to the company which hands out the largest blocks of stock.

• • •

That somebody is expending enormous sums of money in futile experiments to prove the utility of lighter-than-air craft.

• • •

That lighter-than-air craft warrant this expenditure.

• • •

That the taxpayer pays.

• • •

That if the taxpayer doesn't pay, he will when a foreign power attacks us from the air.

• • •

That Gen. William Mitchell was right.

• • •

That New York City with its flying police for bandit-catching in the air is the joke of aeronautical and political circles.

• • •

That everyone but New York City sees the joke.

• • •

That forty hours per year for Reserve pilots is not sufficient to maintain ordinary, not to mention military, flying efficiency, and that something ought to be done about it.

• • •

That nobody will do anything about it.

• • •

That the present service pay-increase bill before Congress is 100 per cent justified and would be passed with proper agitation and publicity.

• • •

That such a bill won't be passed.

• • •

That there should be more and better solo parties.

• • •

That air and alcohol do not mix.

• • •

That no aviator is ever justified in refusing a drink.

• • •

That the proportion of approved cross-country hops is too small by fifty per cent and that of those authorized

(Continued on next page)

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FACTORY ½ PRICE



SURE SPRAY

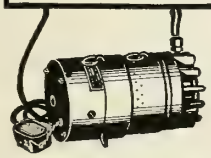
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(*Continued from preceding page*)

almost none are in the right directions.

• • •

That civilian Pensacola is far worse than civilian San Antonio, unfortunately.

• • •

That the reverse is also true (also unfortunately).

• • •

That girls in both these aviation training centers have but a single idea; i.e., to marry into the service.

• • •

That if the Father of His Country had a bicycle, it's lucky airplanes weren't invented then.

THE NEW GEOGRAPHY

(*Continued from page* 54)

can be developed to take care of airplanes, seaplanes and dirigibles. It is strategically located for national defense. It is surrounded by a great acreage available for industrial plants. And it is ready in the raw for whatever needs to be done to it; there is no need for wrecking crews to dispose of yesterday so that tomorrow can have its way.

So in terms of the future, Hog Island is a very sound investment, though it looks like nothing today. If Philadelphia doesn't weaken, she will someday own one of the world's greatest airports.

It is considered good sport among the national neighbors to give the city of Phiadelphia the cheerful razzberry. It is delicately insinuated that most of its inhabitants are dead, but that nobody likes to mention it to them; that nothing moves more than four miles an hour in Philadelphia except the traveling salesmen on their way out; that people come from all over the United States to die in Philadelphia because they can leave it so cheerfully for another world. In answer to which, we loyal Philadelphians wish to refer you to the work of the Regional Planning Federation.

Without going into all the disgusting details, let me explain that this organization spends all its time and a good deal of money figuring the future fifty years ahead. It plans where the city shall grow and why, lays out future development systems, allows for parks and playgrounds, locates industry and warns against unhealthy congestion. In order to do so intelligently, it has made a score of studies and surveys of 10,000 miles of territory in Philadelphia's neighborhood. As part of this picturing of the present, it owns what may be the largest aerial map in the country, big enough to include all the 10,000 miles but detailed enough so that the citizen can put his finger on his own chimney tops. If you have been led to believe that aerial photographs are only good for golf courses and Niagara Falls, you should see this monstrous map of Philadelphia and her vicinity and learn better.

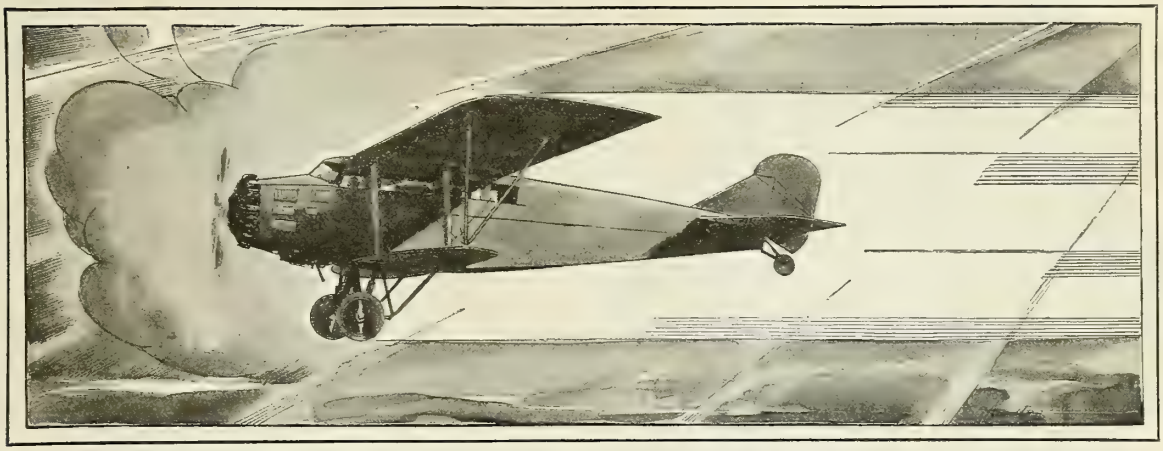
There is nothing fantastic about the work of the Regional Planning Federation. It is a business proposition, supported by business money, and the business men of Philadelphia use it regularly in planning their programs. It is interested in present facts and their future consequences. When it talks of the future of Philadelphia, it is not the ordinary spellbinding of a chamber of commerce secretary but a sober analysis of what is certain and what is likely.

So when the Federation appoints a special committee to map the airways and locate the airports for the coming generation, it is not suffering from an attack of aeronautical megalomania. It is facing the needs of the future as they are indicated in the present. And it is interesting to note what it says.

It says, for instance, that ground organization is ninety

(*Continued on next page*)

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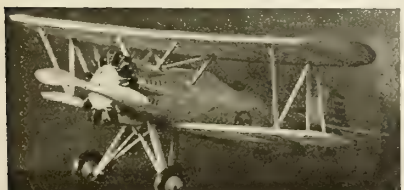
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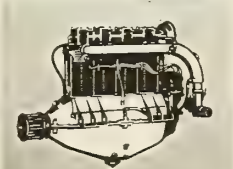
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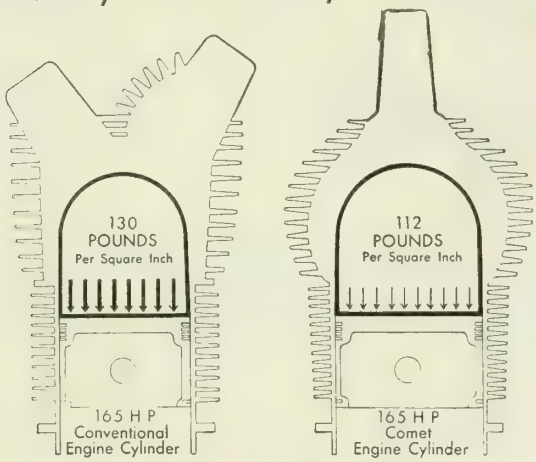
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Roll your Comet-powered plane out of the hangar—load up, and fly away. Do it every flying day for a year—or more. Have the valve clearances adjusted every 50 hours—or do it yourself—it's easy. Take care of oil and greasing. You will not need an overhaul for 300 to 500 hours. Durability (economy) is another advantage of Comet power.

Why?

When an engineer designs an automobile engine he gives the wearing parts plenty of reserve strength so they can do their work at ease, without strain. He also designs for low m. e. p. (brake mean effective pressure)—as low as 100 pounds pressure per square inch—so the engine *cannot* be made to work as hard as it *could* work. That is one reason why automobile engines last a long time with low upkeep costs.

But aircraft engine designers have followed the wartime practice of making their engines work at or near their utmost capacity. Conventional aircraft engines, without supercharging, run as high as 120 to 135 pounds per square inch, on the theory that the utmost power must be obtained from the least weight of metal. So durability—reserve strength—is sacrificed for maximum attainable power. The result is expensive maintenance and parts replacements, with the possibility of failure and resulting delays.

Comet sacrifices neither durability nor performance. Durability is attained by building into the vital parts of the engine—the wearing parts—the weight saved in the simplified valve mechanism and cylinder head. Performance is accomplished by providing an unusually large cylinder displacement which permits holding the brake mean effective pressure to a modest figure—112 pounds per square inch.

Durability—another reason why Comet owners are

at ease in the air

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(*Continued from preceding page*)

per cent of the air transportation problem, and that a whole district's air facilities are in last analysis a matter of ground facilities—of airports large and small, terminal connections and well-placed landing fields. It says that air traffic will center naturally and by preference on communities which make provision for it on the ground. It says that airports at intervals of thirty-five miles are a minimum requirement of prospective air traffic. And it warns all whom it may concern that good airport sites "are becoming increasingly rare, especially in the neighborhood of large cities."

It also settles the present neighborly jealousies between Camden and Philadelphia by considering these two cities as a twin center of a great aerial system, reaching from New York to Washington and from Atlantic City to Harrisburg. It was compelled to extend its studies far beyond the strict limits of the Philadelphia metropolitan area covered by its regional plan, since the 4,000 miles within the plan can be hopped in half an hour by an airplane. And at the heart of an aerial map which takes a chunk out of three States and bites into two others, two great airports are no more than enough.

Just a few figures on the territory covered by this aerial system, and that will be enough of statistics. It is estimated—according to the Philadelphia Business Progress Association—that within an aerial hour of Philadelphia live 16,000,000 persons. The district produces every year goods worth more than $13,000,000,000. Is it any wonder that Philadelphia thinks it needs an airport and a big one?

So now we can get back to our geography and call it a day. The geographers are making a new set of maps, and the best of them are making them in advance as a guide to the future rather than waiting until they are nothing but a record of the mistakes of the past. The maps are based on air mileage, on airports present and prospective, on the natural and business routes of the airways and on the business prospects of the air. They are not illusions or pretty pipe dreams. They are made now because they are needed now. The new geography is based on transportation and air transportation is a major part of its problem. That's why Philadelphia has put the city in hock to the tune of $3,000,000 to buy an airport site, and that also is why it's a good investment.

I'VE SEEN THE AIR SHOW

(*Continued from page* 65)

car, and the one behind it, came from Detroit with all lowers filled to Buffalo, and no uppers occupied. At Utica, which we've just passed, the only other passenger from Syracuse on—a dyspeptic traveling salesman with family troubles—got off. That left me as lord of the manor. I have a private car from here to New York. The car behind contains one discouraged looking lady—I've looked her over and am staying in this car, so you see all that the car has in it. Well, brothers, all is not beer and skittles in transportation, even when it's on the ground. Two empty Pullmans to be dragged all the way to New York. That lady and I simply rattle in these steel containers. I mention this to show that travel is light, even in trains. Don't be discouraged. We're in a slack time just now. As Amos and Andy say, there'll be a lot of big "propolitions" coming along soon. Hold tight on the curves.

Well, I'm just rambling along here telling you about the future when there are a lot of things in the immediate past I should mention. For instance, the Detroit All-American Aircraft Show and the Erie Canal. I'll finish the canal

(*Continued on next page*)

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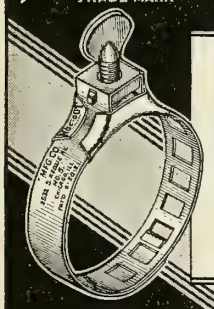
Before too heavy an outlay of time or money is made on an invention, a Search of the Patent Office records should be made to determine as nearly as possible whether or not the same idea has been Patented before. The cost of this Search is small, while the value of the facts it uncovers is often considerable. We offer inventors, manufacturers and attorneys a thorough, prompt, confidential Search Service—plus experienced counsel and assistance in every phase of Patent and Trade Mark practice.

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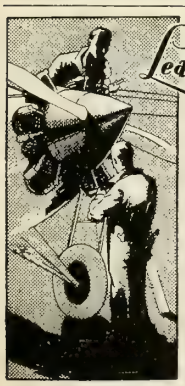
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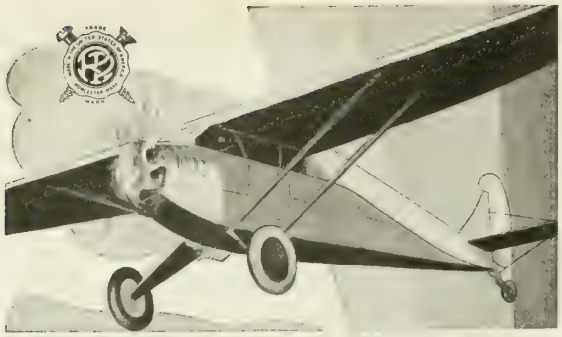
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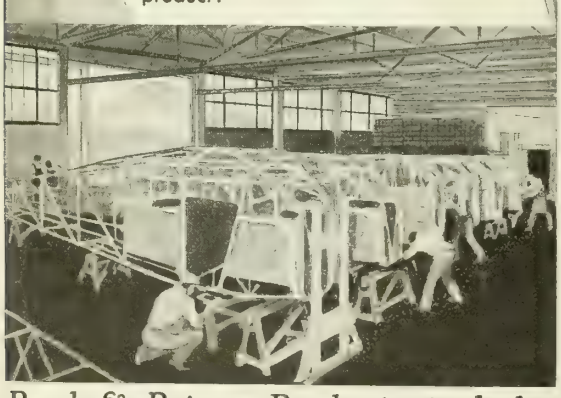


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(*Continued from preceding page*)

first because I'm sick of it—I've been looking at it all day and I'm "regusted" with it. The Erie Canal is the place where they originated the words "low bridge," which any partner I've ever had has been playing from then on. As you ride along in the train you can see the old Erie Canal that cost millions to build and that would cost ten times as many millions to duplicate today. And what is it now? It's as highly regarded as Smith Brookhart. In places they've even dried it up and have built warehouses and garages over it. There's a whole transportation system, costing millions, discarded. It's a lesson telling us that times change. The railroads, giving more speed, killed it. The airplanes, giving more speed, eventually will kill the railroads for fast transportation over long distances. They'll never hurt the transportation of freight by rail or of transportation of passengers by rail or road over short distances. Already the railroads with forward-looking executives recognize this and are linking up with the airplanes.

After this prognostication you may cut yourself a piece of cake and settle down for the second spasm which is on the air show at Detroit. Times have become so hard in the writing business that a writer, or a semi-writer such as myself, has to write on two subjects in order to make a living. Well, well, getting to the show and pretending a note of glad merriment for the benefit of two readers in Arkansas who wish they had been there and who would have been bored as I was if they had been there, the thing went off like all aircraft shows. It was a great success. The airplanes were put in, the public was dragged in, and that was that. You could have thrown a brick in any direction and not hit a potential buyer of an airplane. The public came to look, listen, and walk out to a taxi. It was a standard show. The pilots demonstrated their airplanes to each other and the salesmen told each other how good their airplanes were.

Ray Cooper put on a great show, that's all there is to it. He and Cliff Henderson are real showmen, and aviation is a big winner by having those boys. I mention them together, though Cliff had nothing to do with the Detroit show. But both of them use the same tactics. Courtesy and kindliness and attention to details are what they specialize in. And foresight is another amazing quality they use. Oddly enough, they both recognize that pilots really have something to do with aviation. This isn't always recognized at shows, you know. But Ray and Cliff recognize it, and to their credit be it said that they do all they can for the pilots. For instance, Ray gave Carl Egge a room to use for the pilots, not only National Air Pilots Association members, but any and all pilots. It was a fine large room filled with comfortable chairs where the boys could meet and loaf and talk. That was thoughtful of you, Ray, and the boys appreciate it. The same should be done at every show.

We really seem to be progressing in understanding in this business. For example, Cliff Henderson and Major Schroeder, who are putting on the National Air Races at Chicago, called a meeting of all pilots to discuss rules for the races. For the first time in the history of aviation, so far as I know, a whole group of pilots was asked what they thought of the rules and were invited to make suggestions. There's a step forward, all right. Incidentally, many of the events are to be run off from race horse starts—a system that I figured out about five years ago and wrote up in AERO DIGEST under the title "The Air Derby." Do you recall it? I got the razzberry from a few folks at that time —and here are the National Air Races being run under

(*Continued on next page*)

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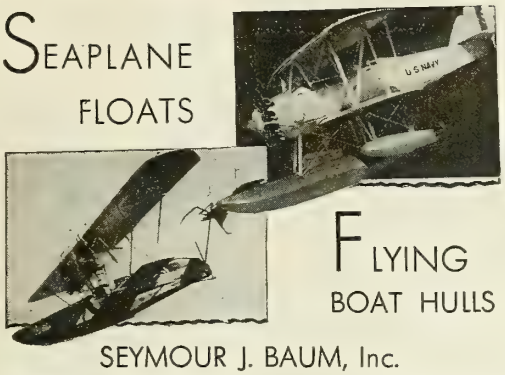
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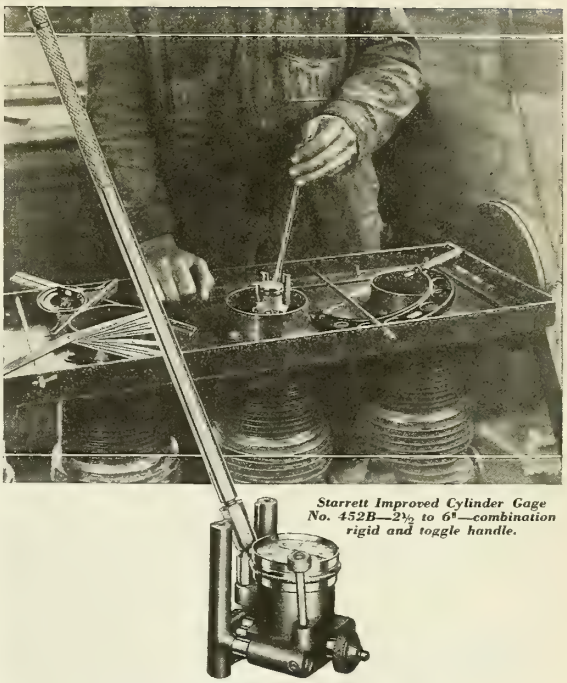
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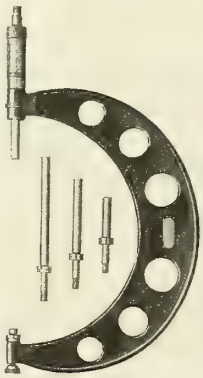
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(*Continued from preceding page*)

that plan! If I could only predict the movements of the stock market, I wouldn't have to be sitting here writing this in order to pry a living from a reluctant world.

Now I'm going to make an admission. This show at Detroit was the first aircraft show I've actually seen. I was at all the others but didn't see them. I saw them through a glass, darkly. And it wasn't a telescope, either. That one at Chicago—do you recall I had to nurse George Haldeman through a period of illness? All the medicine was made in Scotland. And at Detroit two years ago I got stuck in the Statler. I depleted the Detroit liquor supply so much they had to run extra boats to Windsor. If I'd died there the rum runners would have canonized me as their patron saint. Saint Cy—that would have been a rather fitting end to a lifetime of hard alcoholic labor. Picture a rum runner, dodging a hail of enforcement bullets, praying to an image of me, with a halo on. "Saint Cy, protect me!" And I'd have come back from the spirit world and splashed Detroit River water in the eyes of the gunners. I'd have been about the busiest saint they have up there. I might even have had to look after the trucking end of the business. I'd have been overworked until Bert Acosta passed away. Then I'd have had Saint Bert to help me.

Well, the reason for all that glass work was that I never had a job to do at any show. I just went there to raise hell and have a good time. And believe me, a good time was had by all, except possibly the house dicks. But this time I had an important job to put over. It was in connection with the Safety Campaign in aviation sponsored by the United States Aviation Underwriters, Incorporated. That meant a lot of writing and speaking here and there. So it was up to me to stop playing and get to work. Well, believe it or not, but I didn't have a single drink—or a double drink—all that week of the show. And I was invited time after time. I just said, "No, I'm working and I never drink when I work," which is a fact. The effect of this announcement was devastating. Strong men broke down and cried like babies. "Are you deserting us?" they moaned. I was the sad sensation of the show.

And now I'm going to say a few serious words on the liquor question and its relation to aviation. I'm not preaching, and I'm not reformed. I don't believe in Prohibition, for I know that it cannot be enforced.

But—and this is a great big BUT, brother pilot—you can take it as a fact coming from an old free and easy rum hound, there is a feeling being built up in this business that the public drinking we pilots have indulged in at shows and races is having a damaging effect on public confidence. Now, we haven't drunk any more than conventions in other lines of business have drunk. The average convention in the United States of any industry is largely alcoholic. Ask the hotels. We're no better and no worse than other folks. But don't forget that we have got aviation out of the "game" stage. We are now selling transportation to the public. That public is used to being carried by sober railroad engineers and conductors, by sober steamship captains and mates. Drink and transportation don't go together in the public mind. The public drinks—sure! The public hires a compartment on the *Century* and may get soused in that compartment. But it DEMANDS that the engineer of the train remain sober.

Now, we know that no transport pilot flying passengers or mail flies with any drink in him, whether or not he drinks occasionally in his off hours. But the public doesn't know that. People see some of us at shows roaring through

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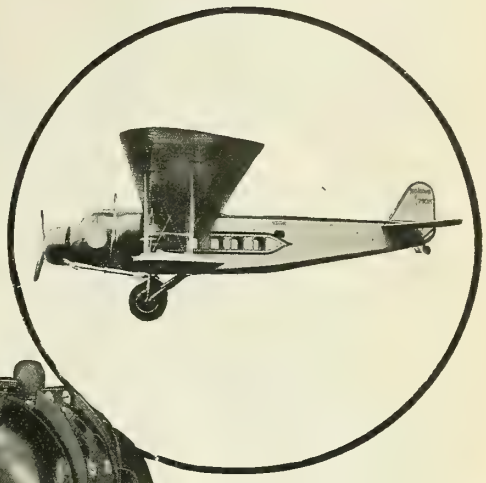
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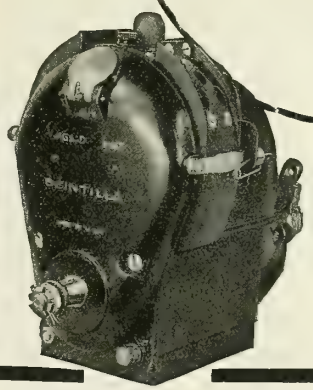
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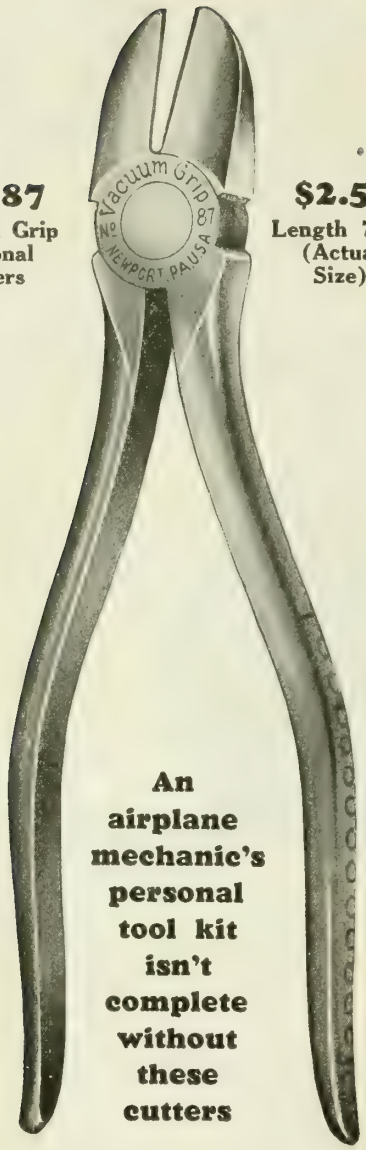
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(*Continued from preceding page*)

hotel corridors and being "good fellows." That's all very amusing perhaps, but they don't want to fly behind us. At the Safety Meeting of executives held in Detroit that question came up. The consensus of opinion was that there should be less drinking at shows and that the wild ones among us shouldn't continue to give adverse publicity to the business. And I'm passing along to you boys who read this the very definite opinion that was formulated there. The drinking pilot is on his way out. Make no mistake about that.

For the good of aviation I'm going to make this personal contribution: At these air shows and races where we are as a body in the eye of the public, I am not going to be seen by the public with any liquor whatever in me. I've done it in the past, but I'm doing it no more. I can read the writing on the wall. Transportation and drink don't mix. Pilots, not only commercial pilots but Army and Navy pilots, should be known as a sober body of men. They must be known as that if they have the good of our industry at heart.

This aviation used to be a game, but now it's a business. I've played up the drink question in articles and got comedy out of it. But for the past year I've not mentioned it. I saw the effect was bad on the public, so I cut it out. We all want to see aviation forge ahead. It isn't going to forge ahead on liquor.

Well, pour yourself a malted milk and stick with me to the bitter end. I'm rolling down the Hudson River Valley now. The scenery is grand. Spent half an hour talking to the rear-end brakeman, trying to learn something about transportation. He tells me that years ago in the railroad business a man could be fired from one road and go and get a job on another. He can't do that today. Personnel is checked up. If a man works up a bad record on one road that record is passed along to the next road he applies to. The boomer is gone. The boomer pilot is going. Today insurance companies are checking pilots, watching their record. If they are unsatisfactory on one line and transfer to another line, the insurance company carrying that line's insurance is apt to say, "We can't insure any equipment flown by Mr. Blank. We know his record." The marine insurance companies exercise complete supervision over marine activities and dictate who is to run the boats. The companies writing aviation insurance are getting in the same category.

Well, let's get back to the show. One fellow I missed there was Jack Atkinson with his "union of pilots" idea. I know Jack and he's a good fellow, but he sure has got off on the wrong foot this time. Pilots are not going into any union and are not identifying themselves with the plasterers' union or the plumbers' union or even the bricklayers. Jack, I'm surprised at you! Lose the idea that you sit at a desk and collect contributions from the nit-witted among the new pilots—you won't get a dollar bill from the old-timers and you ought to know it by this time. Just call it a day and get back with the boys. I sat in on a meeting of the National Air Pilots Association, and I know what the consensus of opinion was. We're not having any union idea, Jack. Pilots are not union men—they're professional men. Piloting is a profession and a mighty fine one, and pilots are not going to lower its status by aligning with trade unions. We're a different breed of cats, and we're going to stay different. You may fool the kids and get their ten dollars, Jack, but you're not fooling the old timers. I didn't see any of the old crowd wearing overalls or sending back for their tools. The operators and the

(*Continued on next page*)

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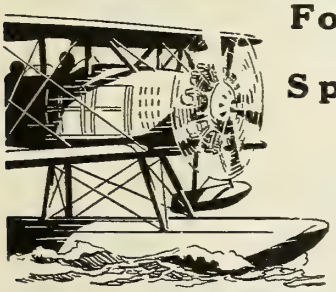
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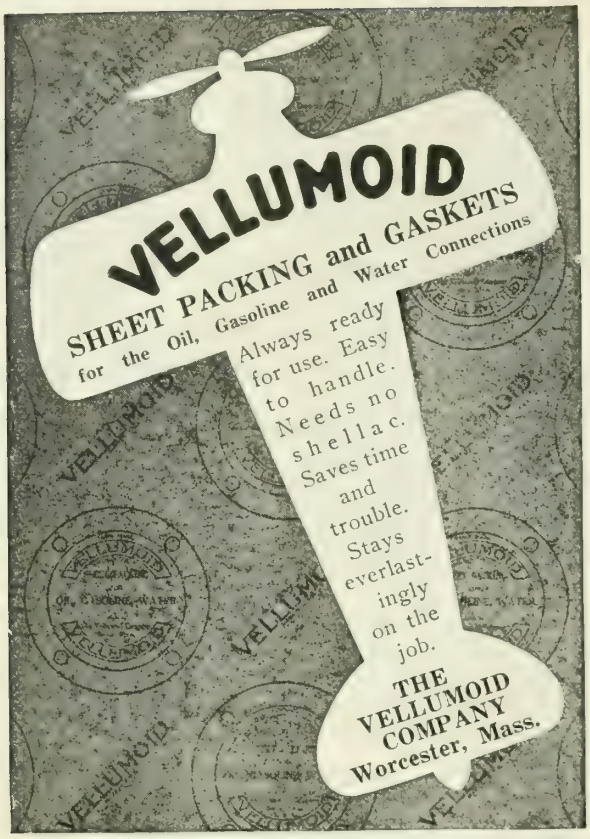


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(*Continued from preceding page*)

pilots are going to stick together.

Say, the salesman who managed to plant those wax images in some of the planes on display must have been a genius. He could sell anything. Those figures looked like the ghosts of departed pilots wearing sun-tan powder. There they sat, day after day, staring glassily ahead of them. I don't believe I'm an especially sensitive creature, but one of those wax pilots gave me the creeps. He bore a strong resemblance to a pilot I knew in the war and whom I had last seen lying in the mortuary at Cranwell. It was something of a shock to observe what looked like the mournful ghost of my poor departed friend flying a modern commercial airplane.

Say, I just walked back to the last car to get a breath of fresh air and cinders from the rear platform. You remember my mentioning that the car behind contained only one discouraged looking lady. Well, it appears on further investigation that she isn't really discouraged—she said she just happened to be thinking of her husband at the moment. She's got him off her mind now and doesn't look too bad for a blonde on a railroad train. (Blondes never look their best on a dusty train—they soil so easily.) You know my first casual glance led me to believe that she was a red-head—that Chicago red-head has unsettled me, I fear. But that was simply the reflection from a red lantern carried by the rear-end brakeman. She's a real blonde, or else some drug store has helped her to deceive me. And a very, very interesting woman she seems to be. I can see now that I've really been wasting my time on this train. She got off at at Yonkers, but otherwise seems quite normal. Normal for a blonde, that is.

She told me a most interesting aviation fact. Did you ever wonder how the airplane came to be invented? Well, as I get the story from her, it appears that someone dared the Wright brothers to invent something fast enough to keep up with the Peggy Joyce.

THE DETROIT AIR SHOW

(*Continued from page* 58)

Airster models of the two-passenger, side seating open variety included the Monoprep, Taylor Chummy, Simplex, and the Gee Bee, a new job by the Granville Bros. Aircraft Co. The latter is a wire braced biplane revealing neat workmanship and an original stick control which cleaned up the cockpit nicely. However, an empty space of two or three feet in the fuselage between the engine and the cockpit is not efficient.

Two monoplanes of the six coupes being manufactured landed in the show—the full cantilever Kari-Keen and the Lambert-powered Monocoupe.

Three-passenger open land machines included the Alexander Eaglerocks with OX-5 and Comet engines, Travel Air, Pitcairn, Ryan, Laird, Brunner Winkle Bird, Fairchild, Waco Straight Wing with Warner and Taper Wing with Wright, American Eagle and Rearwin, all biplanes. The Barling NB-3 was the only standard monoplane in this model. A new ship was shown by the Buhl company in a convertible mail or three-seater job of high performance. The ship is very clean and is equipped with the Wright 300. It is of the low-wing variety, wire braced, the lift wires being anchored to an understructure that is in close proximity to the ground.

The Savoia-Marchetti three-place open model amphibion attracted considerable attention because of its neat lines and excellent workmanship. It is of wood throughout.

The only three-place closed plane of the Cab type was the

(*Continued on next page*)



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MFRS.—DANVILLE—VIRGINIA

(Continued from preceding page)

OX-5 engined Curtiss-Robertson Robin, now priced at $2,495. Practically all three-place open and closed models were off-shoots of the OX-5, and it is surprising that more manufacturers do not widen their fuselages a few inches in these models when installing lighter or more powerful engines, placing their products in the Coach or Tourister categories, with a payload increase of fifty per cent and negligible decrease in performance.

The only four-passenger open job shown was the Eastman boat, powered with the Packard Diesel. This is the usual strut-braced biplane with dural hull, and the workmanship is excellent.

Coach models for four included the Verville, Ryan, Stinson Junior, American Eagle and Spartan, the latter a new ship, having plenty of wing area, excellent streamline, a novel forked undercarriage and an interior finish second to none.

Three amphibions of the four-passenger closed type were on exhibition, the Keystone-Loening Commuter, Sikorsky and Issoudun. The first makes use of a modern type of dual wheel control, the shafts working through the dash and leaving the cockpit unobstructed. The Sikorsky showed the usual splendid workmanship which is associated with products of that manufacturer, and the job is very accessible, roomy and comfortable. It bears the customary resemblance to the Sikorsky line of short hull ships. The Issoudun is powered with two Warner 110-horsepower engines mounted on the wing. It is highly experimental and appears to need a reworking.

In the line of larger closed jobs were the five-passenger Fokker Universals, six-passenger Travel Air, Bellanca, Ryan, and Ogden Osprey. The last named is provided with three Cirrus in-line vertical engines which should encourage pilots to look ahead while flying, since the engine nacelles blanket side vision to some extent. Beyond doubt the ideal engine for the nacelles of small three-engined planes is the horizontally opposed type, and models of this variety will probably make their appearance soon.

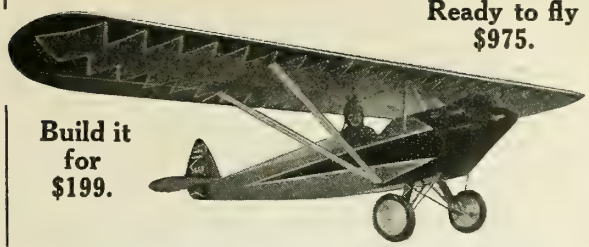
The seven-passenger Lockheed Vega was shown in wood and with metal fuselage, the latter a particularly creditable job. The Consolidated Fleetster of the same capacity, but with circular metal fuselage instead of elliptical, affording more comfort, sincerely flatters the Vega, and like its predecessor has the windows located high in the fuselage.

Fokker showed two seven-passenger jobs, the Super-Universal and the F-14A, a parasol model with the wing mounted on a cabane above the fuselage to permit the pilot to see ahead and under it; said pilot has given up his usual place to the toilet in this design and modestly taken a seat in the rear. This matter of toilet juggling reminds one of the cautious admonition of Jim Eastman, to transport designers, regarding the location of the bar. He maintains that the bar rail must be as near the C. G. as the design warrants, purely from the safety viewpoint—which sounds refreshing.

The Stinson, Metal Aircraft and Towle companies exhibited eight-passenger closed planes. The first two are well known, and the last is a flying boat which can be converted into an amphibion with little difficulty. It is powered with two Packard Diesel engines, is of clean design and excellent workmanship.

The Stout division of the Ford Motor Company exhibited three models of its trimotored transport, powered with Packard Diesel, Wright 300 and Wasp engines. The second named ship hung from the roof beams over a miniature replica of the Ford Airport and, with engines turning over

(Continued on next page)



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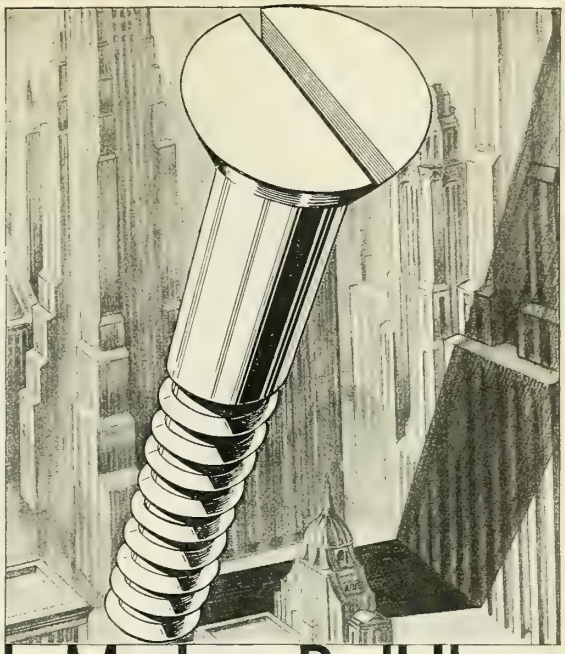
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(*Continued from preceding page*)

slowly, attracted considerable attention. The novel idea may be carried a few steps farther, placing the terrain below on a belt traveling over rollers and enabling modocks to have access to the ship, even if for only a few moments.

The Fokker F-10 needs no comment other than that it, with the F-14, was equipped with Townend rings in place of the usual N. A. C. A. cowls. The big 32-passenger job completed the plane exhibit. It was surrounded with five other large planes by the same manufacturer and constituted the most imposing display.

Many of the plane exhibitors remained outside the building with their jobs, evidently preferring to demonstrate to prospects rather than exhibit to the merely curious. As ships grow in size and number, the problem of showing them to the public will increase in magnitude. A possible solution of the difficulty may exist in allotting space to plane manufacturers for a few days only, the remainder of the time being spent on the field in demonstrations. All in all, the show was a success from the popular interest standpoint but not an entire source of satisfaction to those hoping for much-needed engineering improvements in planes.

The Packard Diesel engine easily carried off the honors among engine manufacturers, there being ten of these installed in ships on the floor, and at least two on the field—a Waco and Stinson. Packard has given engine manufacturers something to think about, and it is a source of regret that no one is taking a similar place among plane designers.

TWO-WAY RADIO COMMUNICATION

(*Continued from page* 57)

and wind velocities at various altitudes. He may be advised to take an alternate route in order to avoid a storm area, the presence of which might otherwise be unknown to him. If the airport of his destination is not suitable for landing, he may be definitely informed of the fact before he arrives, and other more suitable fields can be located for him in advance. Furthermore, if he lands at some isolated intermediate field, the ground staff is immediately reassured as to his safety, and can keep him informed of the advisability of later continuing his flight.

As more radio equipped planes make use of the major airways, the value of exchanging weather reports among themselves will become increasingly valuable. This use is already regarded as one of the major advantages of radio. But aside from talking with other planes, the only direct contact that the pilot has, is the radio station at the nearest airport. If these stations are to fulfill their functions properly, they must have a network of observers available on the ground, upon whom they can draw for their information. This plan necessitates a fast and reliable system of ground communication which will tie together all of the observers, meteorological offices, airports and radio stations.

The importance of the ground communication network cannot be stressed too strongly. It is actually the nerve system of the air transport company. The accompanying schematic map indicates that there are three types of communication involved. (See page 57.)

First, each of the airports gathers individual weather reports from observers in the vicinity, which is usually done over the ordinary telegraph or telephone lines. These reports are represented on the map by dotted lines.

Second, the adjacent radio stations, located at main

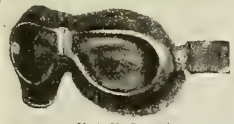
(*Continued on next page*)

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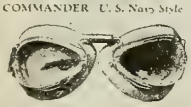
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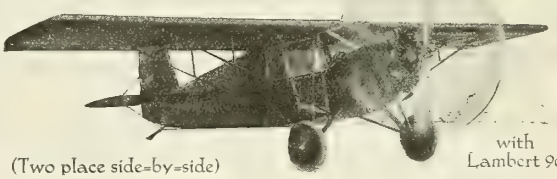
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	No	Price	No.	Price	
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of AERO DIGEST, published monthly at New York, N. Y., for April 1, 1930.
County of New York } ss.
State of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Frank A. Tichenor, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the AERO DIGEST, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Aeronautical Digest Publishing Corp., 220 West 42nd St., New York, N. Y.; Editor, George F. McLaughlin, 220 West 42nd St., New York, N. Y.; Managing Editor, None; Business Manager, Frank A. Tichenor, 220 West 42nd St., New York, N. Y.

2. That the owners are: The Aeronautical Digest Publishing Corp., 220 West 42nd St., New York, N. Y.; Frank A. Tichenor, 220 West 42nd Street, New York, N. Y.; Jessie H. Tichenor, 220 West 42nd St., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed) FRANK A. TICHENOR.

Sworn to and subscribed before me this 28th day of March, 1930.

(Signed) ANNA HIGGINS,
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(*Continued from preceding page*)

stopping points along the route, must be in direct communication with each other at all times, which may be done either by telegraph, telephone, or point-to-point radio. The arrival and departure of ships, the exchange of weather reports, and other vital messages regarding operations, pass over this circuit. It is represented on the map by the solid line.

The third class of communication takes place between certain of the major airports along the airway. At these points are located trained meteorologists, who make periodic forecasts of the weather in each of their respective zones, based primarily upon the individual reports collected at each of the smaller airports. The meteorologists then exchange this information with each other, and draw up a general forecast for the whole territory. The latter circuit is represented on the map by the broken line. On large transport systems, where several different routes are operated in the same geographical area, a separate circuit is desirable to tie together all of the major airports. On smaller systems, however, a single circuit will serve for communication between both major and minor points.

As the pilots fly along the airway, they receive over the radio, first, "spot" weather information, from places in their immediate territory; and second, local and general forecasts of the weather conditions in each of their zones. The despatchers and meteorologists, who are located at the major points, are able to check the course of the planes, report upon the wind velocities at various altitudes, suggest more suitable routes in the event of bad weather, keep the pilots advised as to landing conditions at the scheduled stops and intermediate fields, and in the event of impossible flying conditions, order the pilots to turn back or land, pending an improvement.

There are some things that radio cannot do. It cannot lift the responsibility for the safety of the plane and its cargo out of the hands of the pilots. It should be regarded as a medium of furnishing information, and not as a means of controlling the course of the plane, or turning the pilots into automatons. The wider application of radio to aircraft operation will undoubtedly continue to increase the reliability of air transportation, but its ultimate success lies entirely in the hands of the pilots.

The fact that radio telephone may be in operation over any particular airway does not necessarily mean that the reliability of flying is appreciably increased unless a thorough system of weather reporting and dispatching is there to back it up, and the confidence of the pilots in its use has been established.

INTERPRETING THE WEATHER MAP

(*Continued from page* 59)

when we may look for sudden changes, and approaching showery weather. Pilots at this time should be on guard especially for "Lake Region" types of low areas. With flying activity increasing in the spring of the year, it is well for pilots to acquaint themselves with weather types for this season which on cross-country trips may catch them unawares with low ceiling clouds and showers and thunderstorms or line squalls, resulting in *possible forced landings.*

Caution is advised when there are areas of low barometer moving east across the Lake Region, thence northeast down the St. Lawrence Valley. A "trough" of low pressure extending southwest into the Alleghany Mountains is a condition giving rise to sudden line-squalls and thunderstorm development, especially if the day temperatures are quite high and surface winds south or southeast.

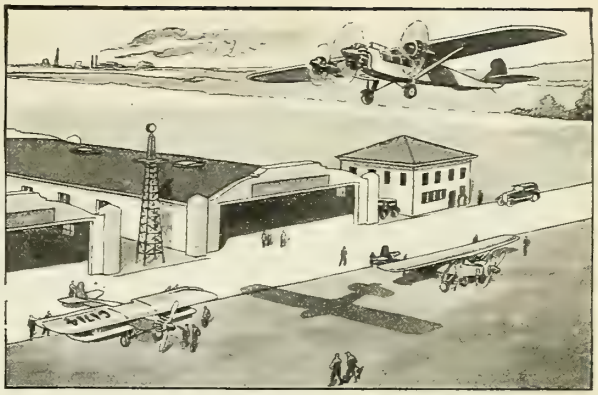


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(*Continued from page 75*)

And now I come to a rather ticklish discussion.

We pilots, like any other distinct class of individuals, naturally defend ourselves. If a brother pilot errs, we are wont to condone his shortcomings and defend his reputation under the erroneous impression that we are defending our own. But, under the circumstances, is this the wise course to pursue? Is it best for commercial aviation? Is it even best for the pilots at large? I think not.

When a crash occurs, there is always a cause, for every effect has its cause. It may be the weather, it may be the ship, it may be the ground crew, or it may be the pilot. Statistics show that in most cases it is the latter. Since we are seeking the remedy, why not face this fact and do our utmost to apply a remedy?

It is rather severe on the pilot who lives through a crash to have the blame placed upon his shoulders. On the other hand, if he is obviously at fault, does he not deserve it? And wouldn't such a course tend to eliminate the poorer pilots to the betterment of aviation? And wouldn't it also make his brother pilots more careful in the future—to the benefit of all concerned?

If the pilot loses his life, and the fault is actually his, certainly to blame him will do him no harm. He's in a world, whichever way he went, where crashes are unknown—presumably. If the deceased pilot could reincarnate himself long enough to express an opinion, he would probably be the very one to approve of this course. He certainly would if he placed the good of aviation ahead of his personal interests.

Nevertheless, we must be careful that the pilot is blamed only in cases where he is unquestionably at fault; we must be certain of the evidence. He must not be made the "goat" in order to cover up the mistakes of the management, the ground crew or defects in the ship.

And now a few words in defense of the pilots.

Air transport pilots, particularly those on schedule airline operation, have a great responsibility in many cases without the authority which should go with this responsibility. They are given a ship costing from $50,000 to $100,000, fitted with instruments which are not infallible; they are entrusted with the lives of a dozen or more passengers, and then told to get through on time if they can do so without unnecessary risk to the lives of those on board. And far too often that pilot is considered best who most regularly brings his ship in on schedule.

Because of the increasing competition between airline operators, the wing-loading of air transport ships is continually being increased. Partially to offset this condition, the power-loading is being decreased. Which, of course, all makes for greater speed, and speed is what the public expects in air transportation and what the operators are trying to give. As a result, the present transport jobs land with a speed far above the normal speed of the fastest express trains. Only pilots of great skill and experience may safely be entrusted with such projectiles, for that is practically what they are. And, in a way, this is unjust to the pilot.

If I were asked what, in my opinion, is the most desirable improvement of air transport ships, I should unhesitatingly reply, "Increase the distance between the landing and the cruising speeds." In other words, decrease the landing speed.

Fortunately for commercial aviation, aeronautical design is rapidly tending toward this end. The variable pitch propeller will enable the pilot to get his maximum engine power and thrust on the take-off, and then high efficiency at cruising speed. Slots, flaps and a wing section with characteristics adjustable in the air will mean decrease in the take-off run, rapid climb and lower landing speeds. The result of the Guggenheim competition accomplished much toward safer flying, and it should not be long before the aviation industry will profit by the lessons learned.

In the meantime, brother pilots, the future of aviation lies very largely in your hands. By the time the next Department of Commerce accident report is issued, let's see if we cannot greatly reduce that percentage of "errors due to the pilot." And one of the surest ways of doing so, in my opinion, is to "see as you go; or don't go!"

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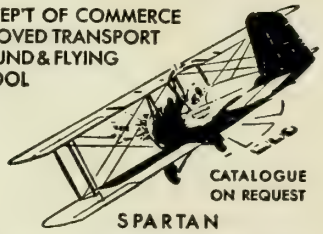
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Cleveland Pneumatic Tool Co.
Fischer Spring Co., Charles
Hartshorn & Company, Stewart
Hobbs Manufacturing Company
International Nickel Company, Inc.
Kelsey-Hayes Wheel Corporation
Libby-Smith Mfg. Company
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Anderson Flying School
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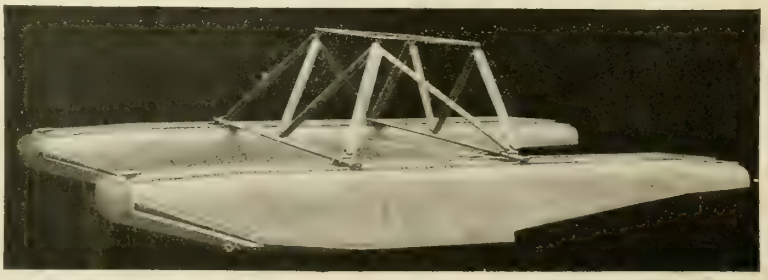
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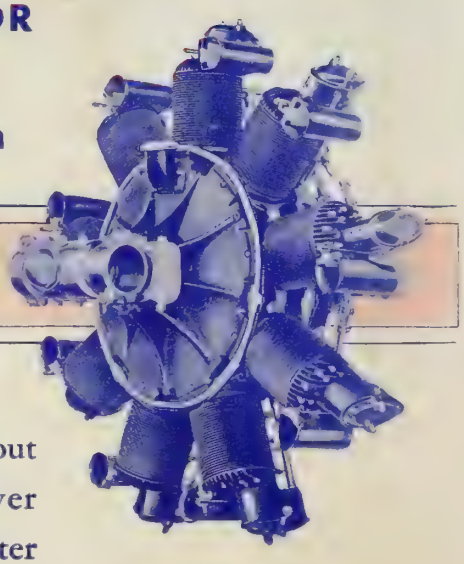
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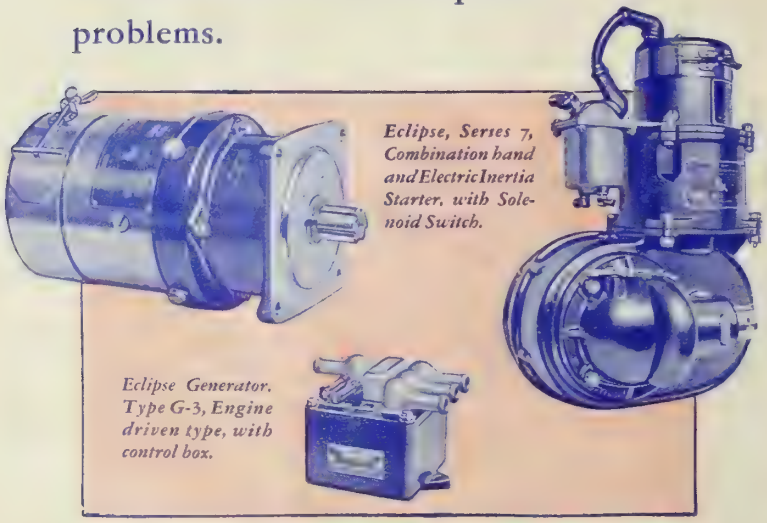
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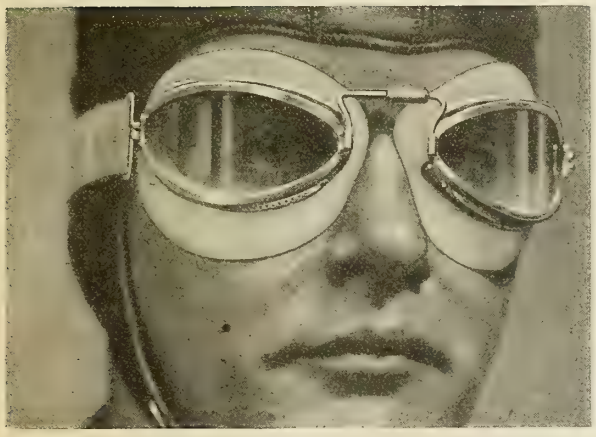
Also Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, P. Q.; In Continental Motor Works, Munich; in Japan by Nakajima Aircraft Works, Tokyo

monthly by Aeronautical Digest Publishing Corp., at 220 W. 42nd St., New York, N. Y. Yearly Subscription $3.
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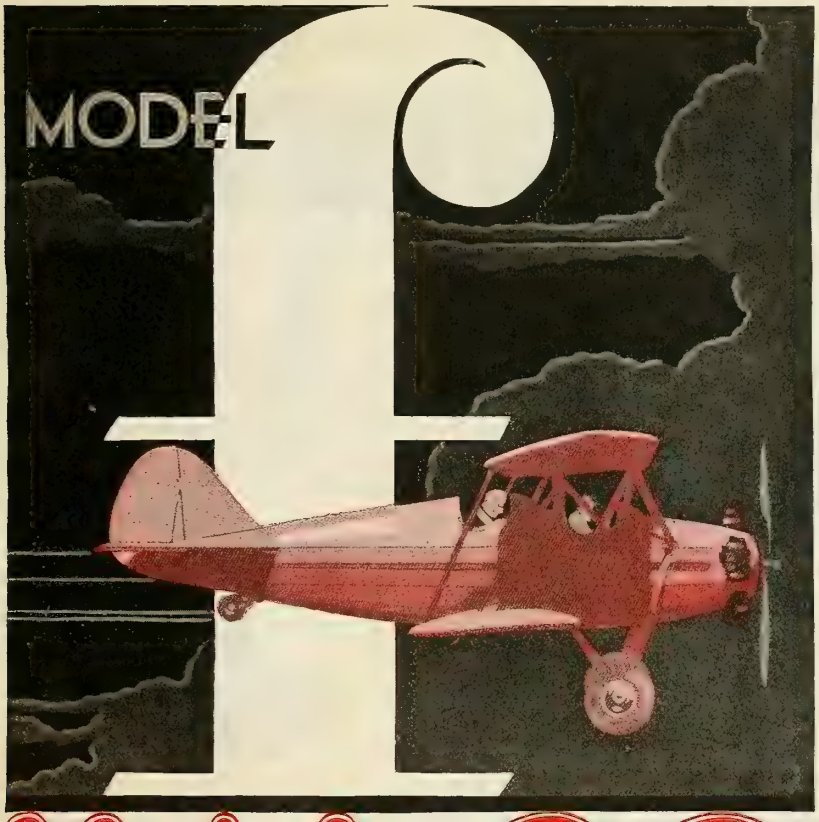
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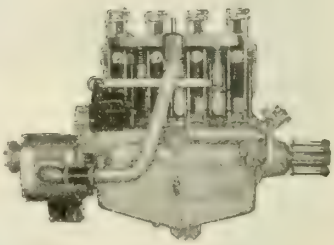
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ANOTHER CIRRUS ACHIEVEMENT

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In addition to the prizes offered by American Cirrus Engines, Inc., and shown on opposite page, the A. C. Spark Plug Co. has announced an additional prize for the winning plane providing A. C. Spark Plugs are standard equipment. The City of Detroit has also promised a prize fund to be divided among all pilots who finish the race behind the first three.



American Cirrus Engine with DePalma Supercharger

AMERICAN CIRRUS ENGINES, INC.

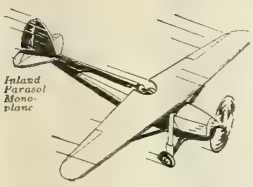
★ The following plane manufacturers have already entered planes for the race: United States Aircraft Corporation, Ltd.; Eyerly Aircraft Corporation; Whittelsey Manufacturing Co., Inc.; U. S. Aircraft; Fernic Aircraft Corporation; Great Lakes Aircraft Corporation; Earl Aviation Corporation, Ltd.;

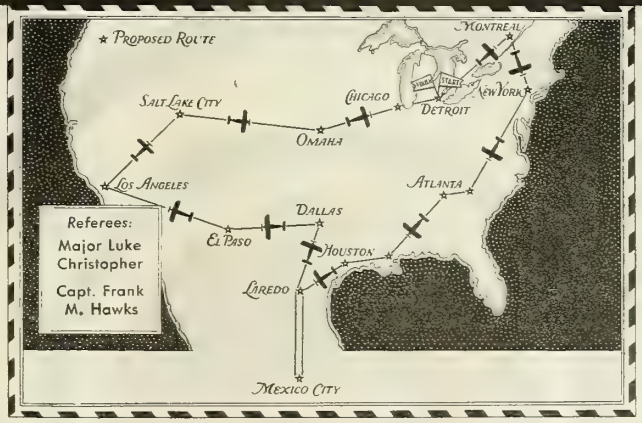
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IN THE AIR


Ogden Osprey Multi-Motored Monoplane

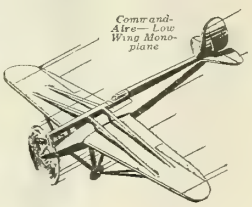

Emsco-Cirrus Center Wing Monoplane


Inland Parasol Monoplane




Great Lakes Speedster Bi-Plane

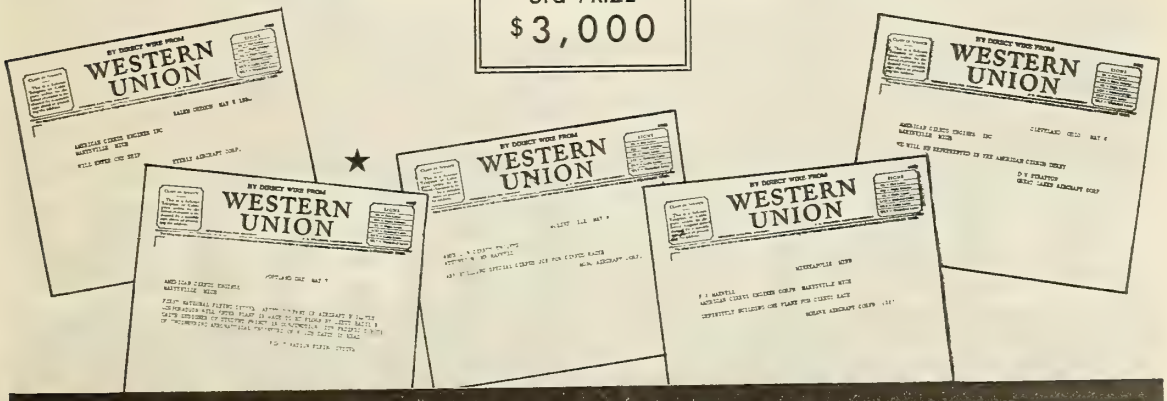

Buhl High Wing Monoplane


Commandaire— Low Wing Monoplane

Planes i lustrated are typical of types already entered for race

The winning of this race will undoubtedly be a matter of minutes, possibly seconds. The utmost care in preparation is highly desirable. We strongly urge that all pilots test their planes most thoroughly; that they run the engine in the particular installation they intend to use for at least 25 hours before starting. Every detail of installation must be correct; every engine should be thoroughly seasoned. This is the world's greatest race with the world's greatest list of entries. It will prove the world's greatest contribution to contemporary aeronautics. Pilots are urged to place their orders at once.

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2nd PRIZE
$7,000
3rd PRIZE
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8:00 A. M.	Lv. Chicago	Ar. 6:00 P. M.
	Lv. Iowa City	Ar. 6:00 P. M.
10:15 A. M.	Lv. Cedar Rapids	Ar. 6:00 P. M.
11:30 A. M.	Lv. Des Moines	Ar. 2:00 P. M.
1:00 P. M.	Lv. Omaha	Ar. 12:40 P. M.
1:30 P. M.	Lv. Lincoln	Ar.
	(Mountain Time)	
2:45 P. M.	Lv. North Platte	Ar.
5:00 P. M.	Lv. Cheyenne	Ar. 7:30 A. M.
9:30 P. M.	Ar. Salt Lake City	Lv. 4:00 A. M.
	(Pacific Time)	
9:00 P. M.	Lv. Salt Lake City	Ar. 2:30 A. M.
1:30 A. M.	Lv. Reno	Ar. 10:00 P. M.
2:30 A. M.	Lv. Sacramento	Ar. 8:50 P. M.
4:30 A. M.	Ar. Oakland—San F.	Lv. 8:00 P. M.

For schedules and tariffs write
Boeing Air Transport, Seattle, Washington



Boeing Model 80-A, used in Chicago-San Francisco service

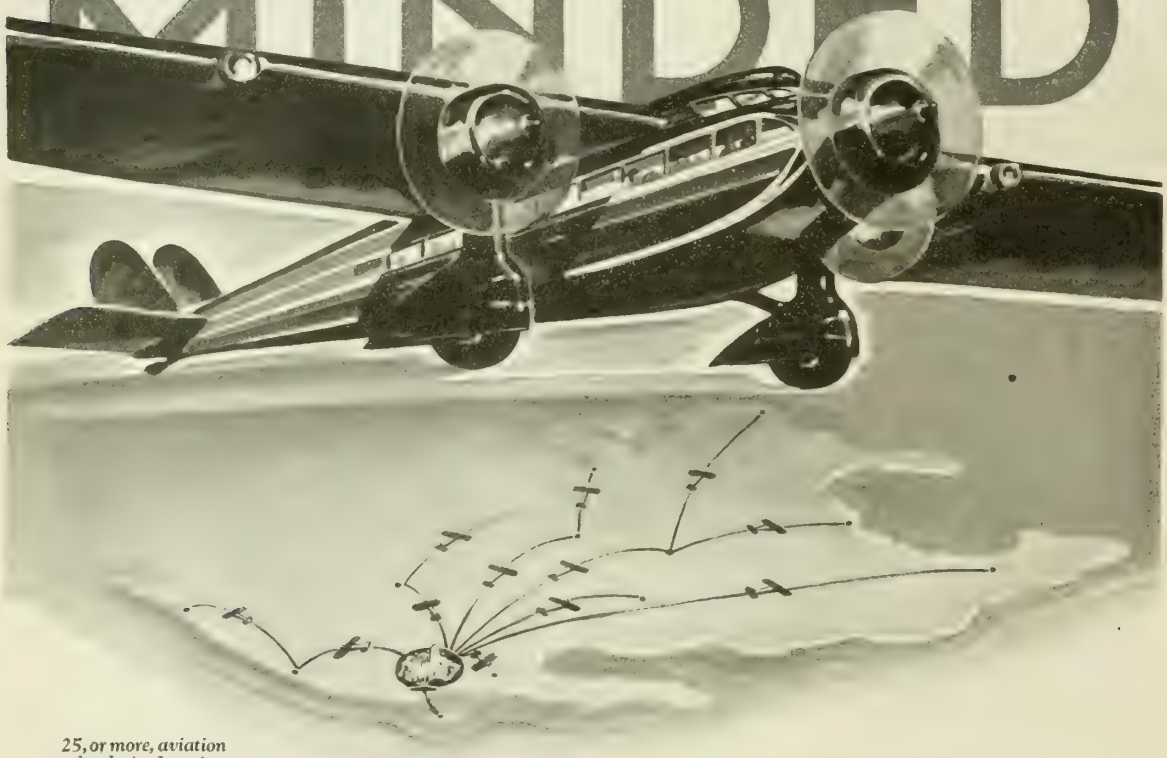
Phillips 77 AVIATION

Phillips Petroleum Company

Bartlesville, Oklahoma

© 1930, Phillips Petroleum Co.

AIR MINDED



25, or more, aviation schools in Los Angeles County now training over 1000 students.

$5,500,000 aircraft production here in 1929.

Low building costs.

Hydro-electric power, natural gas and fuel oil, and abundant water... all at low cost.

Contented labor and ideal living conditions.

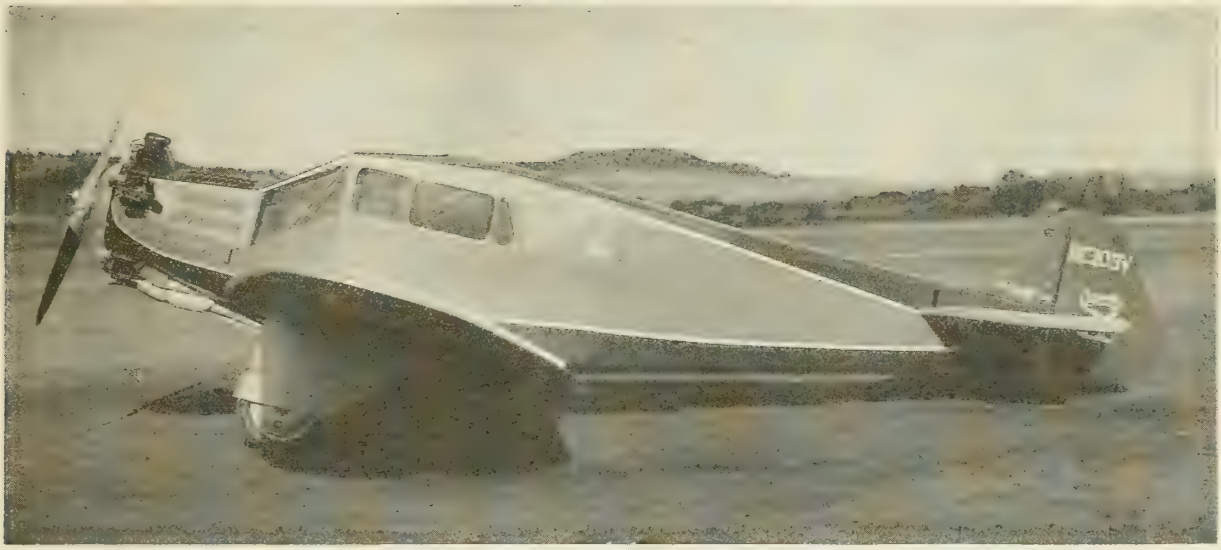
Six transport companies operate nineteen regularly scheduled lines in and out of Los Angeles daily, to and from New York, Kansas City, Salt Lake City, El Paso, Dallas, Mexico City, Seattle, San Francisco, San Diego and other points.

Approximately 60 percent of all aviation in California centers in Los Angeles County. There are more licensed and identified aircraft here than in any other county in the U.S...57 airports and landing fields. The logical location for aircraft manufacturing.

For detailed information regarding aircraft manufacturing opportunities in Los Angeles County address Industrial Department, Los Angeles Chamber of Commerce

LOS ANGELES COUNTY

Approved!



While undergoing tests last summer the early experimental Bullet (shown at the right) revealed bad spin characteristics. In the present Alexander Bullet (shown above) engineering research has overcome spin trouble. This ship is approved by the Department of Commerce and carries Approved Type Certificate No. 318. The longer fuselage and redesigned tail surfaces contribute long sweeping lines. The cabin is larger and more roomy. Wing span is shorter and a high-lift air foil is used. Landing gear fairing, as shown, or the retractable gear is optional equipment. Phenomenal speed and carrying capacity with resulting operating economy still characterize the Alexander Bullet.



A Year Ahead in Performance and Economy

During the last racing season an experimental Bullet, powered with a 165 h.p. motor and piloted by Errett Williams, toured the country taking prizes against all competition. In all races in its own horse power class it consistently placed first. It often outflew 300 h.p. competitors in free-for-all races and always placed "in the money."

The approved Alexander Bullet is still a year ahead. It offers the best performance for its horse power in America. With a 165 h.p. motor it carries four people and a dog at 148 m.p.h. It has quick take-off, rapid climb, high maneuverability and slow landing speed. Naturally operation cost per passenger mile is low.

Treat yourself to a Bullet demonstration at your first opportunity. Not until then have you approached the ultimate in airplane transportation. It is ideal for private use, a money-maker for the taxi operator and a dividend-payer in transport work.

SPECIFICATIONS

Gross Weight	2780 lbs.
Weight Empty	1720 lbs.
Disposable Load	1060 lbs.
Pay Load	610 lbs.
Wing Span	36 ft.
Wing Area	208 sq. ft.
Wing Loading	13.3 lbs. per sq. ft.
Power Loading	16.9 lbs. /h.p.
Length	26 ft. 10 in.
Height	7 ft. 9 in.

PERFORMANCE

High Speed	148 m.p.h.
Landing Speed	48 m.p.h.
Climb (full load) approximately	700 ft. per min.
Take-off (full load)	17 sec.

Flyaway $7200 Factory

Powered with Wright J-6 165 h.p. motor; equipped with Bendix brakes, flying and landing lights and compass, in addition to usual instruments.

ALEXANDER AIRCRAFT CO.

403 Alexander Industries Bldg.
Colorado Springs, Colo.

ALEXANDER BULLET

AC MIKO SPARK PLUGS

Heat range selection, with seven gradations of insulator lengths, makes available a type of AC Miko Spark Plug to meet the heat characteristics of different engines and different operating conditions.

If chronic fouling is experienced, select a type in the AC Miko line with longer insulator. If pre-ignition, rapid electrode wear or blowing-by is experienced, select a type in the AC Miko line with shorter insulator.

The number stenciled on the insulators of AC Miko Plugs indicates (in 1/16ths of an inch) the length of insulator exposed to the combustion heat. Coolest type (M-2 with 2/16″ insulator) is one having lowest number; hottest type (M-8 with 8/16″ insulator) is one having highest number.

FOR AVIATION ENGINES

AC Miko Spark Plugs in Heat Range Gradations



Type M-2 Type M-3 Type M-4 Type M-5 Type M-6 Type M-7 Type M-8

Type M-2 Insulator | Type M-3 Insulator | Type M-4 Insulator | Type M-5 Insulator | Type M-6 Insulator | Type M-7 Insulator | Type M-8 Insulator

AC Miko Spark Plugs are priced at $2.75 each

SPECIAL AC MIKO SPARK PLUG TOOLS

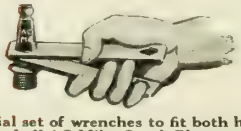
Regapping Tool



Regapping made easy and quick by a short turn of this tool, which exerts pressure on shell and side electrode only and cannot, therefore, strain center electrode or mica insulation.

Priced at $1.00

Take-Apart Wrenches



Special set of wrenches to fit both hexagons of all AC Miko Spark Plugs to permit quick and easy disassembling and assembling for inspection or cleaning.

Priced at $1.50 per set

Cylinder Head Wrench



Special socket wrench for quick removal and installation of AC Miko Plugs in cylinder head.

Priced at $2.00

The popular line of AC porcelain-insulated AC Spark Plugs are likewise available in the Heat Range, with gradations of insulator lengths to meet normal, "hot running" or "cold running" conditions. For greater certainty of performance, give yourself the benefits of AC quality, with the added safeguard of Heat Range selection.

AC-SPHINX
Birmingham
ENGLAND

AC Spark Plug Company
FLINT, *Michigan*

AC-TITAN
Clichy (Seine)
FRANCE

AC SPARK PLUGS AC OIL FILTERS AC GASOLINE STRAINERS AC THERMO GAUGES
AC FUEL PUMPS AC AMMETERS AC OIL GAUGES AC COMPLETE INSTRUMENT PANELS

© 1930, A. C. Spark Plug Co

Soft spot hazards are Gone
FROM AIRPORTS
drained with
ARMCO *Perforated* PIPE

. . . and public confidence takes their place!



Installing Armco Perforated Iron Pipe at Menefee Airport, New Orleans.

ARMCO

A DRY, FIRM, level landing field is more—*much more*—than a safe place to bring down a plane, or takeoff. It is an important factor in the progress of aviation. It is a confidence-builder. It is an often-repeated vote for flying, cast by people who want to lose their timidity and take to the air.

The soft spots which may cause an unhappy ending to an otherwise successful trip can be eliminated simply by installing subdrainage of Armco Perforated Pipe.

Leading airports, cognizant of their obligation to the future of aviation, have put this product of unequalled durability in service. They have more than taken care of immediate needs; they have installed landing field protection for the decades.

Armco Perforated Iron Pipe is made of the conspicuously successful Armco Ingot Iron—24 years in service under the highways and railroads of the United States and Canada, and today unapproached for lasting qualities. More than 50,000,000 feet of Armco Corrugated Pipe are in use, many thousands of installations dating from 1906, the first year of manufacture. Ask Drainage Headquarters, Middletown, for new, valuable data on airport drainage.

If you are

a PILOT . . . a MANUFACTURER OF PLANES . . . an AIRPORT ENGINEER or ARCHITECT . . . an OPERATING COMPANY ATTACHE . . . a PLANE OWNER . . . an AIRPORT MANAGER or ASSISTANT

talk adequate drainage of the airports in which you are interested. Implant the thought that THE CONDITION OF THE GROUND IS IMPORTANT TO THE SUCCESS OF THE AIRPORT—*and more important to aviation, itself!*

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand

ARMCO CULVERT MANUFACTURERS ASSOCIATION
Middletown, Ohio.

© 1930, A.C.M.A.

AMERICAN EAGLE SCORES AGAIN!



THE UNDEFEATED
AMERICAN EAGLE FOUR-PLACE
CABIN MONOPLANE . . . . . .

$5995.00



WITH
OX-5 MOTOR

$2195.00

AMERICAN EAGLE 3-PLACE OPEN COCKPIT BI-PLANE—THE SENSATIONAL RULER OF EVERY 1930 AERONAUTICAL SHOW!

$3995.00

AMERICAN EAGLE PRICES—(FLYAWAY KANSAS CITY)

4-Place Cabin Monoplane (Model 430), Continental Engine	$5995
4-Place Cabin Monoplane (Model 430), Wright J-6 Five Motor	$6395
3-Place Cabin Monoplane (Model 330), Kinner 100-H.P. Motor	$4795
3-Place Biplane (Model 201), Kinner 100-H.P. Motor	$3995
3-Place Biplane (Model 129), Kinner 100-H.P. Motor	$3795
3-Place Biplane (Model 251), Kinner 190-H.P. Motor	$5495
3-Place Biplane (Model 251), Wright J-6 Five Motor	$5995
3-Place Biplane (Model 101), OX-5 Engine	$2195

Valuable distributor and dealer franchises are available in certain territories.

AMERICAN EAGLE
AIRCRAFT CORPORATION
FAIRFAX AIRPORT KANSAS CITY, KANS.
MASTER OF THE SKIES

AMERICAN EAGLE AIRCRAFT CORP.
13 Fairfax Airport, Kansas City, Kansas

Please send full information with descriptive literature concerning the complete line of American Eagle Airplanes.

Name _____

Address _____

City _____ State _____



THE GLIDER — the new vogue in flying propels itself, without an engine, on the wings of the wind.

The skill of the glider pilot draws power for his plane out of the air itself. The Pilot's skill makes the wind efficient. But only good instruments, suited to special needs can give to that skill its one maximum efficiency.

Two instruments made especially for this new art, are offered by our company which is always conscientiously endeavoring to make definite and solid progress throughout the Aviation instrument industry. An Airspeed indicator, of low range, from 0 to 80 miles an hour, is a Glider Air-Speed Indicator. A special low range, 0 to 5,000 feet Altimeter with wide graduations is our glider Altimeter. These with an Inclinometer are set in the Consolidated Glider panel. Such were, we are proud to say, the instruments used with great success by Captain Frank Hawkes on his recent Historic Glider journey.

CONSOLIDATED INSTRUMENTS

CONSOLIDATED INSTRUMENT CO.
of AMERICA, INC.
Baltimore St. and Central Ave. - Baltimore, Md.

Divisions

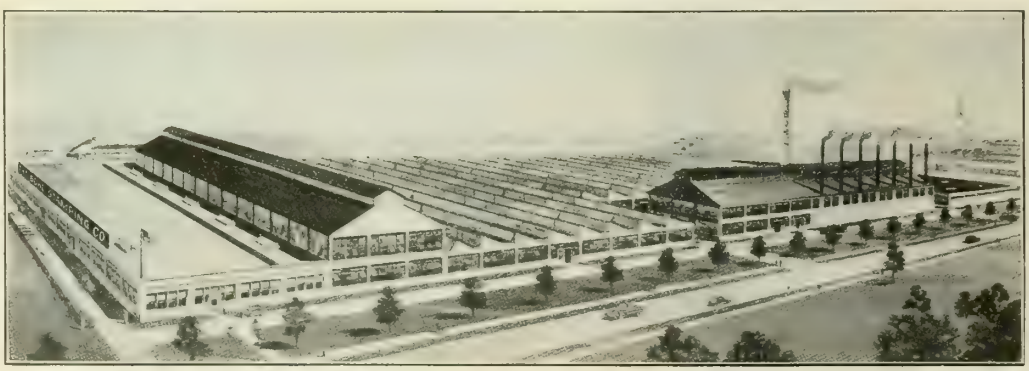
Julien P. Friez and Sons, Inc., Baltimore, Md.
Molded Insulation Co. - Philadelphia, Pa.
Aircraft Control Corp. - Philadelphia, Pa.
Factory Branch - - - Wichita, Kansas
Sales, Service and Repairs - 221 S. Lawrence St.

THE BUHL NAME has been identified with progressive industry since 1833. Buhl products today carry far more than the name alone—they preserve the priceless heritage of almost a century of manufacturing leadership and integrity.

The Buhl Stamping Company is equipped to meet every requirement of the makers of aircraft engines and parts. Here you will find a complete division exclusively devoted to the production of fine metal stampings for aircraft use; drafting and designing rooms; testing laboratories; competent engineers prepared to serve you in any capacity. And behind this most modern display of physical and mental resources stands a record of 40 years' leadership in its chosen field. Surely that is the final guarantee of satisfaction.

BUHL STAMPING COMPANY

DETROIT - - - MICHIGAN



UNDER THE SAME DIRECTION:

THE BUHL BUILDING
Detroit

BUHL AIRCRAFT COMPANY
Marysville

BUHL SONS COMPANY
Detroit

EVERY SHOP NEEDS ONE

"Van Dorn" ¼ INCH LIGHT DUTY ELECTRIC DRILL

$25



Nº D-1100

EVERY shop needs one or perhaps several of these Van Dorn ¼ inch Light Duty Electric Drills to do the many odd jobs not requiring a heavy duty drill.

This Drill is a strong general purpose drill for intermittent service and is not intended for continuous production work. Its light weight and compactness makes it an ideal drill to be carried in a tool kit.

The Van Dorn Electric Tool Company - Towson, Maryland

WRITE

. . . FOR NEW DOPE COLOR CARD AND FINISHING SPECIFICATIONS

NEW airplane colors and a new finishing system are included in Berry Brothers' new combination color card and finishing specifications. The latest hues in Berryloid Pigmented Dope are highly visible—durable—developed especially for airplanes. Lighter in weight than lacquers or oil base finishes—they can be brushed or sprayed on metal or fabric and cost approximately one-half as much as other types of finishes. They won't crack or ringworm under severe pressure, can be refinished without cracking and resist weathering better than any other finish known. Write for our card—see the latest colors and learn the new finishing system.

Manufacturer of Progressive Aircraft Finishes

BERRY BROTHERS
Varnishes Enamels Lacquers
Detroit, Michigan Walkerville, Ont.

Member Aeronautical Chamber of Commerce

PARTS

Masters of the Air
CURTISS-WRIGHT

FLYING SERVICE

ACKNOWLEDGED the largest aircraft manufacturer, Curtiss-Wright Corporation engages in every phase of aviation. Besides its seven manufacturing plants, it maintains 40 flying fields located throughout the United States. These are more than airports—they are completely equipped bases capable of meeting all aviation needs.

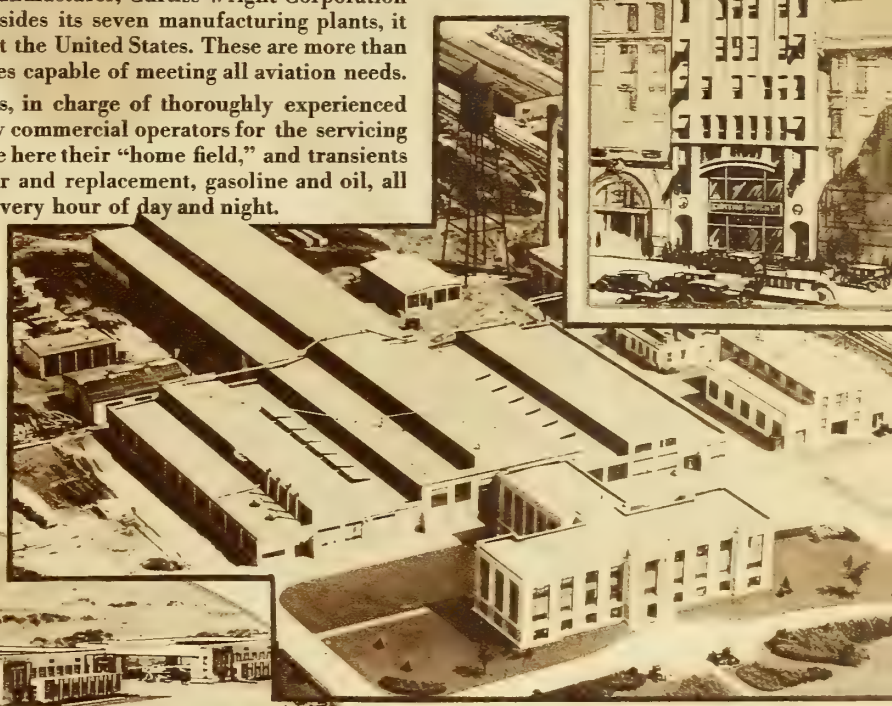
At every Curtiss-Wright base are hangars, in charge of thoroughly experienced men. Not only are these bases relied upon by commercial operators for the servicing of their planes, but also private owners have here their "home field," and transients find complete cooperation. Overhaul, repair and replacement, gasoline and oil, all accessories for flying —these are available every hour of day and night.

At these bases arrangements for sight-seeing trips and charter service for long or short journeys may be made. Tickets may be purchased for trips over the transport lines. Other services are crop-dusting, aerial mapping and photography work.

The prospective purchaser of a plane, at a Curtiss-Wright base, can have any plane, from a light sport model to a luxurious many-passenger cabin transport, demonstrated to him. The man or woman who desires to learn to fly will find every base a flying school equipped for complete training at the hands of veteran instructors. To many people, the opportunity to learn to fly means an open door for greater success.



The Curtiss-Wright Building in New York City, where all aviation activities center.



The largest and greatest staff of aviation engineers carry on their research and experiments in this laboratory.



The Pittsburgh, Pa. Airport—one of the 40 flying fields owned or operated by Curtiss-Wright.



The Curtiss-Wright Flying Base at Los Angeles, one of the 40 which dot the country from coast to coast.



A crop-dusting plane in action—this is only one of the specialized Curtiss-Wright flying services available.

HOW AMERICA THE AIR MASTERY THROUGH CURTISS WRIGHT



The interior of the giant Condor—most luxurious of all transport planes in service.

The 18-passenger Condor one of the largest transport planes now in trans-continent service.



Charles S. (Casey) Jones, famous pilot, president of Curtiss-Wright Flying Service.

MANY recent achievements in the science of flying are linked with the name of Curtiss-Wright. The Tanager, world's safest airplane, won the Guggenheim $100,000.00 prize; the Mystery Ship outsped the fastest Army and Navy flyers, and attained the terrific speed of 235 miles per hour, and the famous St. Louis Robin cabin monoplane holds the world's endurance record of 420 hours aloft. These record-makers owe their sturdiness and reliability to the manufacturing capabilities of Curtiss-Wright.

Rear Admiral Byrd on his South Pole flight selected the Wright engine, as did Lindbergh in his flight from New York to Paris. The Fledgling, designed for Curtiss-Wright Flying Schools, was chosen by the U. S. Navy over eight other makes of training planes, and the 18-passenger Condor is the most luxurious plane in transport service.

These milestones in the progress of aviation are made possible only by the completeness of the Curtiss-Wright Corporation . . . Its vast resources, financial soundness, long experience, its experimental laboratories, largest in the world and a personnel pre-eminent in scientific knowledge. By reason of these unequaled facilities, Curtiss-Wright Flying Service bases represent the best in modern practices of aviation. At these stations the latest improvements in commercial and pri-



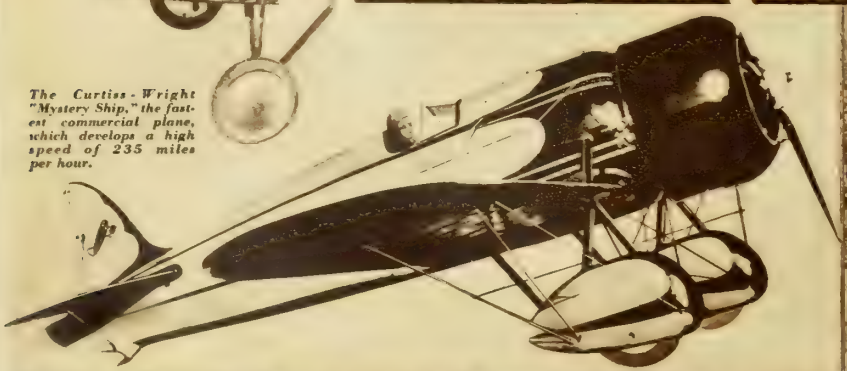
The St. Louis Robin, being refueled on its famous 420-hour endurance record flight.

Many transport lines standardize on Keystone-Loening Air Yachts for over-water routes.





"Red" Jackson making the daily adjustment of the Robin Challenger engine while it was piloted by his mate, Forest O'Brine.



The Curtiss-Wright "Mystery Ship," the fastest commercial plane, which develops a high speed of 235 miles per hour.



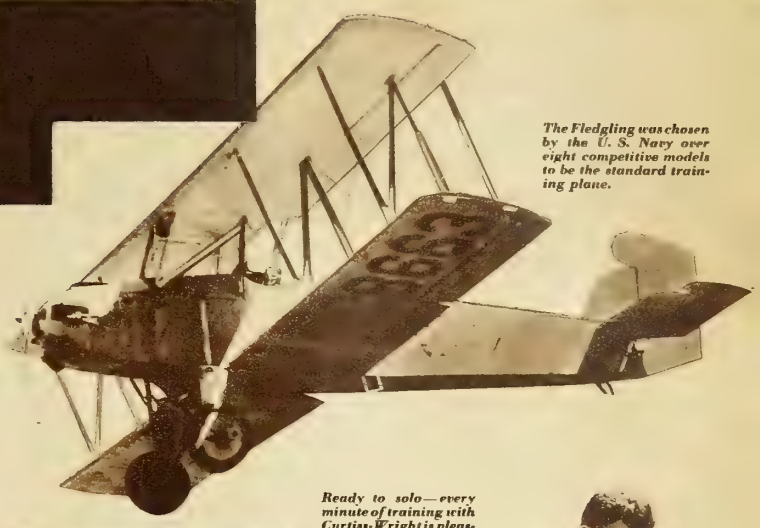
IS GAINING OF THE WORLD

DEVELOPMENTS · · · · ·

vate flying are tried out and brought to their greatest success. Every type of machine is available for study. Here you can acquire, in a short time, a complete mastery of commercial aviation in all its branches, as well as the ability to fly.

Wherever you may be, you are near a Curtiss-Wright Flying School. Each of the 40 schools is completely equipped and staffed by experienced instructors. Here you can find courses that will enable you to specialize. The Primary Ground School teaches the fundamentals, the theory of flight, rules of the air, the principles of airplanes and engines. There are advanced courses for Private Pilots, Commercial Pilots and Transport Pilots. Your training period can be financed on deferred payments, and the time required to graduate may be regulated to conform to your aptitude for flying.

With Curtiss-Wright, you are studying under the oldest and largest flying organization in the world. Commercial pilots of long experience are selected for their abilities as teachers, as well as their special qualifications as aviators. Every detail of each course is approved by the veteran commercial pilot, Charles S. (Casey) Jones, who is president of the Curtiss-Wright Flying Service.



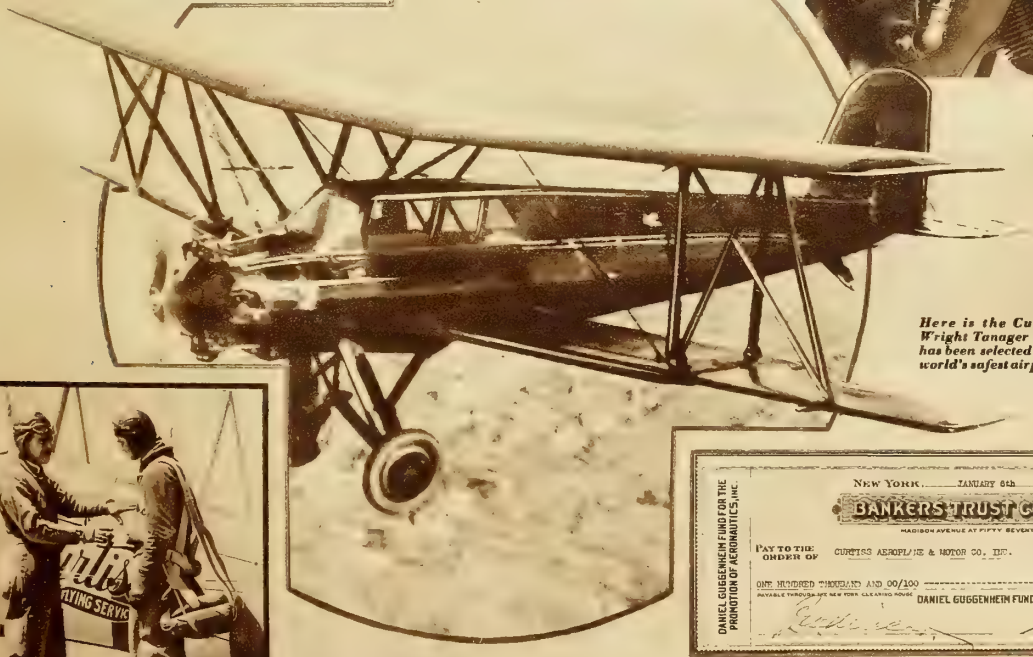
The Fledgling was chosen by the U. S. Navy over eight competitive models to be the standard training plane.





Ready to solo—every minute of training with Curtiss-Wright is pleasant and thrilling.

Curtiss-Wright trained mechanicians know their jobs because they get experience on every kind and type of plane and motor.



Here is the Curtiss-Wright Tanager which has been selected as the world's safest airplane.

Curtiss-Wright Flying School students are instructed in all phases of aviation. This student is receiving final instructions before entering training plane.

The $100,000 prize in the Guggenheim Foundation Safe Aircraft competition was awarded the Curtiss-Wright entry—the Tanager.

FLIGHT INSTRUCTION • TAXI AND CHARTER SERVICE • SIGHTSEEING TRIPS



The plane in which Commander Byrd flew over the South Pole was powered with two Wright Whirlwind engines and a Wright Cyclone engine.

MEN OF TOMORROW MUST KNOW HOW TO FLY

NOW is the time to master the air—easily, pleasantly, thoroughly—with Curtiss-Wright. In a short time you will have jumped years ahead of competitors who still cling to the soil. Aviation is no longer merely a matter of training a few hundred professional pilots every year. The day is here when alert men and women in every walk of life find business success in mastery of aviation.

Good mechanics, clever salesmen, efficient executives, alert business men, will find new and greater fields of endeavor open to them if, in addition to their specialized knowledge, they are at home in the wide highways of the air.

Your decision now to learn to fly with Curtiss-Wright, brings to you the benefits of all their tremendous resources. You learn to fly with leaders. You learn about planes from master builders. You learn about aviation from the world's largest and oldest aeronautical organization. You are equipped in every way for the new work of a new world.

Send for complete information on Curtiss-Wright Flying Courses today. Make this year the big year of your life. The best months to learn flying are *now*. Don't delay—just mail the coupon, checking the information you desire.

Write to nearest base or to 27 West 57th Street, New York City.

Ground School classrooms of Curtiss-Wright Flying Schools are fully equipped with every kind of equipment.



Curtiss-Wright training is complete and thorough. It fits you for all phases of aviation activity.





Curtiss-Wright flying instructors are chosen for their ability to pass their skill on to the student.

CURTISS-WRIGHT FLYING SERVICE

MAIL THIS COUPON TO-DAY

Curtiss-Wright Flying Service
27 West 57th Street, New York

Gentlemen: I am interested in Aviation. Please send me, without cost or obligation, a booklet on the subject I have checked.

- ☐ Flight Instruction
- ☐ $50 Ground Course
- ☐ New Payment Plan
- ☐ Opportunities in Aviation
- ☐ Aerial Charter Trips
- ☐ Free Curtiss-Wright Booklet

NAME _____ AGE _____

STREET _____

CITY _____ STATE _____

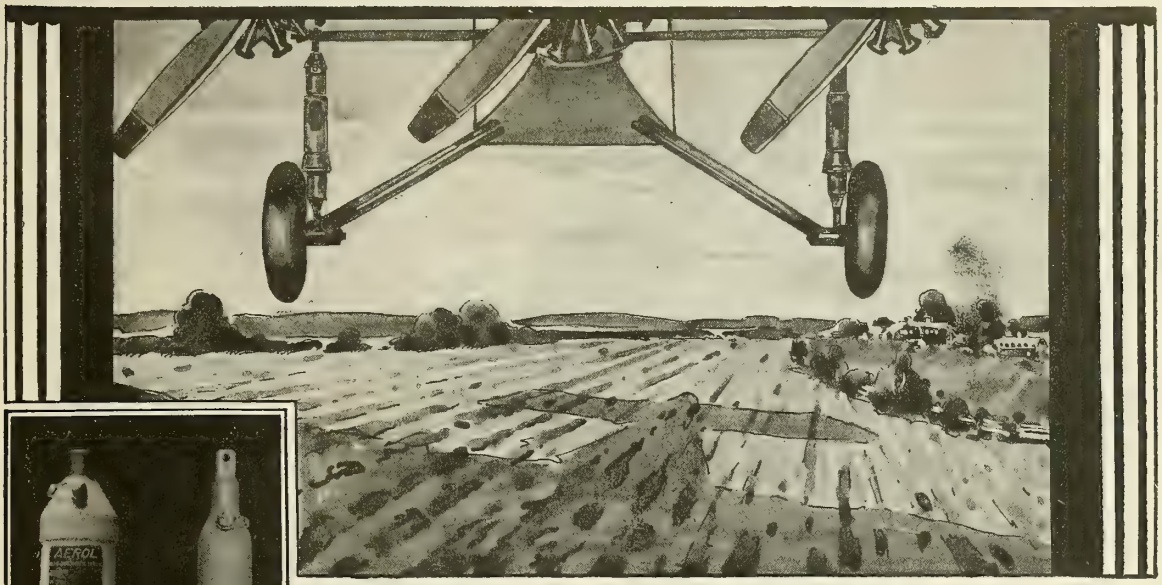


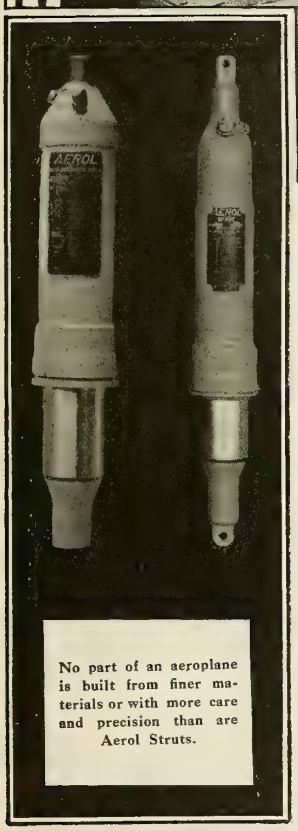
Curtiss-Wright Flying Schools are located at—

Atlanta, Ga.	Denver, Colo.	Moline, Ill.
Baltimore, Md.	Detroit, Mich.	North Beach, L. I.
Boston, Mass.	Hartford, Conn.	Oklahoma City, Okla.
Bridgeport, Conn.	Houston, Texas	Pittsburgh, Pa.
Buffalo, N. Y.	Indianapolis, Ind.	Portland, Me.
Caldwell, N. J.	Kansas City, Kans.	Raleigh, N. C.
Chicago, Ill.	Los Angeles, Cal.	Rockland, Me.
Cleveland, Ohio	Louisville, Ky.	St. Louis, Mo.
Columbia, S. C.	Memphis, Tenn.	San Francisco, Cal.
Columbus, Ohio	Miami, Fla.	Toledo, Ohio
Dallas, Texas	Milwaukee, Wis.	Valley Stream, N. Y.

AERIAL PHOTOGRAPHY • GROUND SCHOOL INSTRUCTIO

Changing Emergency Landings From Crises to Incidents . . . .





No part of an aeroplane is built from finer materials or with more care and precision than are Aerol Struts.

THE increased acceptance of flying rests upon better control of the plane while being landed under emergency conditions. Such performance depends upon the plane's minimum flying speed and its landing gear. Manufacturers owe it to their future and to the pilot and the flying public to give their planes maximum landing performance.

That is why an increasingly large group of plane manufacturers have standardized on Aerol Oleo-Pneumatic Landing Struts. Their presence under the plane changes the vast majority of emergency landings from crises to incidents and establishes unequalled confidence on the part of the pilot.

The telescoping action of these powerful and efficient cylinders absorbs initial impact, eliminates "crow-hopping" and shortens the roll.

Aerol Struts are made in the Military Type for extreme service and the Commercial Type for ordinary operation. Complete information will gladly be sent on request.

Aerol Struts are manufactured by The Cleveland Pneumatic Tool Company, Cleveland, Ohio.

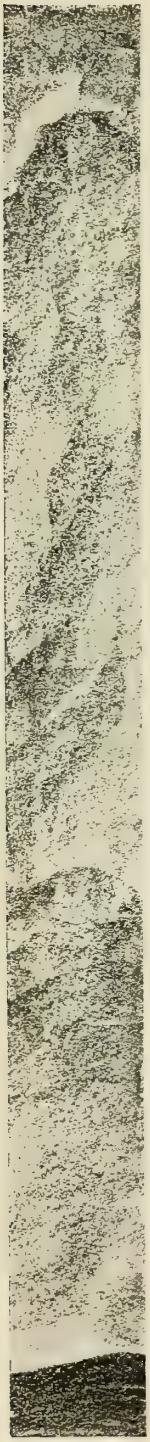
ASK THE PILOTS WHO LAND IN THEM.

AEROL *shock absorbing* STRUT

To Give New Impetus to Flight



Again, with the aircraft Diesel, Packard proves its right to the title, "Master Motor Builders"—and logically. The experience, talent and resourcefulness which, with the perfection of the Packard-Diesel, has revolutionized aircraft power was developed through the years in the designing and building of fine automobile engines. Compared to the difficulties presented in solving *the* great engine problem of the century, the finest car motor of today is elementary. So what greater assurance of supreme excellence could be asked by the automobile buyer than the Packard crest? It distinguishes that car of slender, graceful beauty and luxurious comfort, powered with the famous eight-in-line motor which has contributed most to Packard engineering leadership.



The PACKARD-DIESEL AIRCRAFT ENGINE

To a world already rapidly turning "air-minded," Packard introduces a supremely important engineering achievement, destined to give a new and tremendous impetus to flight.

Packard, the designer and builder of more aircraft horsepower than any other manufacturer in America, now contributes to air transportation the far greater reliability, economy and safety of a radial *Diesel* Aircraft Engine.

THREE YEARS IN DEVELOPMENT

When the epochal flights of 1927 focused the attention of the world on the air-cooled engine and civilian aircraft began to exceed Army and Navy planes in hours and miles flown, motors of less power and lower cost were demanded by a vast new market.

Packard had foreseen this demand but did not care to add but another conventional gasoline engine to the long list of those available. Immediate profits held no lure. But the opportunity to make a truly noteworthy contribution to the science of flight was an attraction and a challenge to Packard engineering genius.

So, equipped with the finest of facilities, adequate resources, the best of materials and machinery and an engineering staff of unsurpassed ability and experience, Packard set out to accomplish "the impossible"—to adapt the *Diesel* principle to radial aircraft engines. The goal if achieved was worth the years and millions it would cost, for the engineering world had long known that the Diesel engine was the *ideal* aircraft power plant. But Packard, in 1927, was embarking upon a course strewn with the wreckage of others' failures. What the engineering talent of the world said could not be done, Packard confidently undertook. And Packard has succeeded brilliantly.

A PACKARD TRIUMPH

In the Packard-Diesel engine Packard has for all time eliminated the principal causes of motor failure. It can almost be said that, like the simple, old water-wheel which had to run as long as water flowed over it, the Packard-Diesel must run as long as fuel flows to its cylinders. For the Packard-Diesel has no carburetor, no magnetos, no spark plugs. It has but one instead of two or more valves per cylinder. Each cylinder has an individual fuel pump, making it an independent operating unit. The fuel is ordinary furnace oil fired spontaneously by the heat of the compressed air in each cylinder.

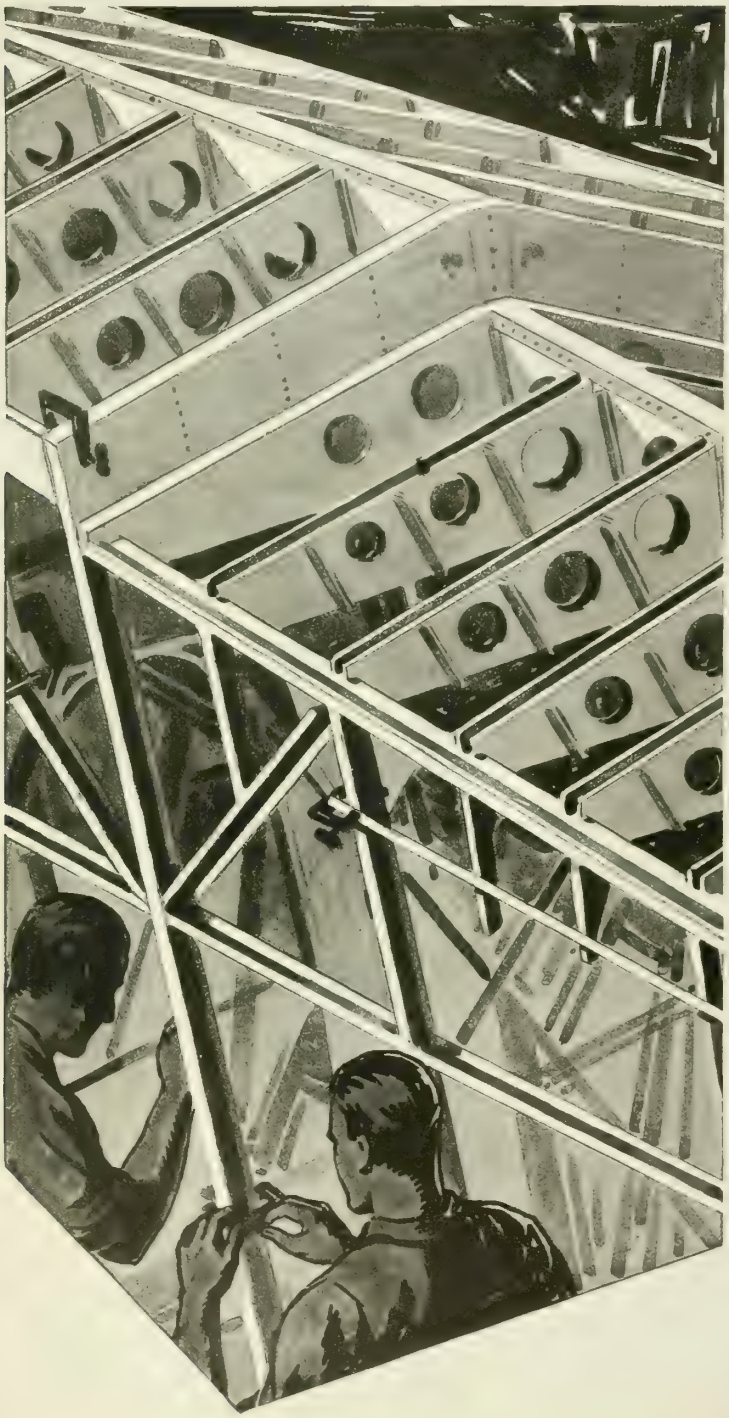
There are three major advantages. *Greater reliability* because of extreme simplicity of design. *Greater economy* because of lower fuel cost plus lower fuel consumption, the latter permitting greater pay loads with longer range of flight. *Greater safety* because the fire hazard is removed through the use of *fire-safe* fuel, and the absence of electrical ignition equipment.

These three advantages mark *the greatest advance in aircraft power* in the history of aviation! Designers and builders of aircraft have been quick to appreciate them—operators and pilots have shown enthusiastic interest. Already the Packard-Diesel engine is offered as optional equipment on the following planes—Ford Tri-Motor, Ryan, Stinson, Verville and Eastman Flying Yacht.

After exacting tests by the United States Army, the Department of Commerce has approved the Packard-Diesel (Certificate No. 43) with an official rating of 225 horsepower. With a weight of 510 pounds this means *but 2.26 pounds per horsepower*. Packard has written a new chapter in the annals of air transportation.

PACKARD

ASK THE MAN WHO OWNS ONE



The best HULL built

In the drilling of an eighth inch hole or the fabrication of a hull, Douglas is concerned with one thought only, *how well can the job be done.* ◆ Every part that goes into the construction of a Douglas plane is carefully engineered, painstakingly built ... of the best materials money can buy! ◆ Every part is carefully inspected for perfect accuracy, quality and strength. Then, and then only, are these parts blended with perfect workmanship to produce another Douglas plane ready to write across the airlanes of the world, the fact that .... Douglas Means .... Dependability!

DOUGLAS AIRCRAFT CO.

INCORPORATED

Santa Monica · California

Though less than one year old...

Central Airport shows amazing growth



It is now the hub of important transportation lines. . . . The Jacobs Aircraft Engine Co. starts producing in new plant. . . . Private plane owners and charter parties steadily increase. . . . It will pay you to locate at the aviation crossroads of the East!

DAILY two-way service on the new Pittsburgh-New York air line connects Central Airport with Boston, Buffalo, Montreal and other cities northward — and with all points west out of the Pittsburgh terminus. Six mail planes, three each way, use the Airport daily. Eastern Air Transport operates Contract Mail Services Nos. 19 and 25 on the New York-Atlanta-Miami route, connecting with South American mail lines; also the transcontinental extension to Washington, D. C. Six-place cabin planes providing a week-end service to Cape Cod are "sold out" long before sailing time.

Central Airport is the focal point for flying activities and flying interest in this section and is *a logical center for the aviation industry.* It is at the approximate center of East Coast population and practically in the "front yard" of the 3,500,000 people living in the Philadelphia-Camden area. No other metropolitan airport is so accessible. Only 15 minutes away by car or bus is the heart of Philadelphia; it is but four minutes to the center of Camden and six minutes to the Delaware River with its ocean shipping and low freight rates to Central and South America and the Pacific Coast.

Here is a great market for planes and flying service — a convenient source of aviation materials and skilled labor. The openly approached flying field in size and equipment conforms with A1.A specifications. Adjacent to it is dry level land ample for extensive manufacturing, servicing and selling operations. Unusually attractive terms are offered to all responsible parties. Simply write "Send details" on your letterhead for prompt attention. Address Central Airport, Inc., Camden, N. J.

Central Airport is headquarters for Department of Commerce Second Inspection District. Spacious fire-proof hangars and modern equipment. Teletype and radio weather service. Complete lighting for night flying. Every convenience for public, transport company or private flyer.

Restaurant, rest rooms, swimming pools, unlimited parking space, two miniature golf courses, picnic grounds and barbecue stand provide the public with increasingly popular recreation center facilities.



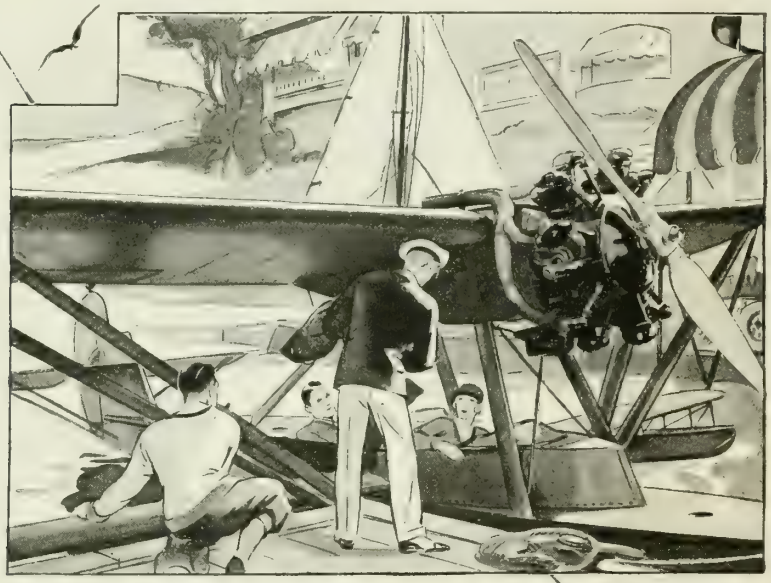
Five broad main highways converge at Central Airport and 100,000 motor cars have been counted here on a summer's day. Visibility as well as accessibility is assured!

PHILADELPHIA-CAMDEN

CENTRAL AIRPORT



. . a new thrill for passengers . . . a speedboat that flies



EASTMAN *Flying Yacht*

Passenger-hopping with an Eastman Flying Yacht offers new opportunities for profit to operators near lakes or sea side. ℂ. Passengers are attracted by over-water flying. They enjoy the thrill of skimming the surface and mounting quickly into the air, without dust and dirt. And they like to know that a continuous "landing field" is always below. That is one reason Eastman operators can charge *twice the regular tariff for every ride*. ℂ. The Eastman accommodates three passengers and pilot in comfort. On the water it steers like a boat, and can be quickly brought around for loading and unloading—which means more trips per hour. In take-off and performance, it compares with a sport-plane. It leaves the water in 8 to 12 seconds—climbs 1000 to 1200 feet per minute. ℂ. Powered by a 170 H. P. engine the Eastman lists at $9985. Its all-metal hull and rugged construction throughout assure long life and dependable service. ℂ. The summer months will bring a golden harvest to Eastman operators. Write for our illustrated catalog and complete information. Our sales franchise will interest dealers.

EASTMAN AIRCRAFT CORPORATION
RYAN AIRCRAFT CORPORATION
LOCKHEED AIRCRAFT CORPORATION
AIRCRAFT PARTS CO., INCORPORATED
PARKS AIR COLLEGE, INCORPORATED
PARKS AIRCRAFT CORPORATION

DETROIT AIRCRAFT

FORT AND CAMPAU STREETS, DETROIT

Chanin Bldg., New York :: Roosevelt Bldg., Los Angeles

BLACKBURN AIRCRAFT CORPORATION
AIRCRAFT DEVELOPMENT CORPORATION
MARINE AIRCRAFT CORPORATION
GROSSE ILE AIRPORT, INCORPORATED
GLIDERS, INCORPORATED
DETROIT AIRCRAFT EXPORT CORP.



Socony Aviation Gasoline is used to refuel this Wright-powered Bellanca plane at the Long Island Aviation Country Club. This club is noteworthy among country clubs of the world in that it is devoted exclusively to flying as a sport and has its own clubhouse, hangar, and flying field.

Ewing Galloway Photo

She's *off* with the first spin

SPIN the prop once, and your engine takes hold—with Socony Aviation Gasoline. No sputtering as you "rev" her up. Then, when you give her the gun, the smooth, steady power in Socony is apparent from the start.

Just try this fuel. Then you'll know why it is so popular with pilots in New York and New England—why Socony Aviation Gasoline is "official" at so many airports. And for complete flying satisfaction and reliability, use Socony Aircraft Oil.

SOCONY

Aviation Gasoline **Aircraft Oil**

STANDARD OIL COMPANY OF NEW YORK

$LiNO_3 + KNO_3$

equals

LONG-LIFE FOR YOUR VALVES

Lithium nitrate and potassium nitrate — the salts used in Rich R.S.P. Salt-Cooled Valves — convey the heat away from the valve seat down the stem and dissipate it through the valve guide bushings. Salt cooling safeguards valves used in engines that operate at high temperatures — and Wilcox-Rich is the sole manufacturer licensed to build Salt-Cooled Valves . . .



Cross-Section of a Rich Salt-Cooled Valve (for Wright "Cyclone" engine) showing the salt mixture in the valve stem when cool. After the motor reaches operating temperature, these salts melt and the rapid motion of the valves circulates the solution, carrying heat away from the valve seat.

RICH VALVES

manufactured by

WILCOX-RICH CORPORATION, *Detroit*

World's Largest Manufacturers of Automotive Valves

Sold for Replacement Purposes Exclusively Through

McQUAY-NORRIS MFG. CO. - - ST. LOUIS *and*

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The Following Aircraft Engine Manufacturers Use Rich Valves:

Allison Engineering Co.
Chevrolet Aircraft Corp.
Chevrolet Aviation Motors Corp.
Crosley Radio Corp.
Curtiss Aeroplane & Motor Co. Inc.
Dayton Airplane Engine Co.
Fairchild Airplane Mfg. Corp.
Kimball Aircraft Corp.
Kirkham Aeroplane & Motors Corp.
Le Blond Aircraft Engine Corp.
Lycoming Mfg. Co.
Michigan Aero Engine Corp.
Packard Motor Car Co.
Szekeley Aircraft & Engine Co.
Warner Aircraft Corp.
Wright Aeronautical Corp.
U. S. Army Air Service
U. S. Naval Air Service



Lowest Priced Amphibion in the world!

$5,550



At a time when Department of Commerce figures show a 363 per cent increase in amphibions and only 51% in land planes, IRELAND rolls out of the hangar the lowest priced amphibion in the world...the smart, trim PRIVATEER.

A $5,550 safe, swanky ship pointing its nose right into the biggest buying trend.

The economic answer to that vast group that has become air-minded but seeks the DUAL-SAFETY and the DUAL-PLEASURES of a combination land and water plane.

The handsome PRIVATEER is a perfected plane. Its smooth performance is a revelation. Seats two comfortably . . . has a gross weight, including useful load, of only 1,595 lbs. . . is powered with a 100 H. P. Wright "Gypsy". . . a high speed of 81 miles per hour . . . a cruising speed of 68 . . . a landing speed of 41 . . . a cruising range of 290 miles . . . takes off land in less than 6 seconds, off water in less than 10 . . . and can be dismantled and reassembled in an amazingly short time.

Of course, the PRIVATEER will "go big" . . . so big that you will want to have the agency for your territory. Get the fast turnover that low price always assures . . . and the big profits that volume sales provide. Write now . . . while territorial appointments are being made.

For PRIVATEER is the headliner of the IRELAND "Big Four"— four fine, time-tested models providing an amphibion for every purse . . . $4,890 (flying boat) to $23,000. Ireland Aircraft, Inc., Garden City, Long Island, New York.

IRELAND *Privateer*



The crankshaft is but one of thousands of machine parts made mechanically perfect on a quantity production basis by grinding.

Norton Company, Worcester, Mass., develops many special grinding machines to meet existing manufacturing requirements.

GRINDING WHEELS, GRINDING and LAPPING MACHINES, ABRASIVES FOR POLISHING,

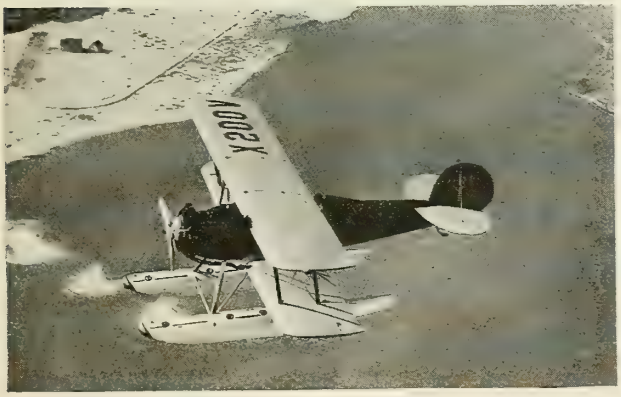
NORTON

PULPSTONES, REFRACTORIES, POROUS PLATES, FLOOR and STAIR TILES, ABRASIVE AGGREGATE.



Confidence in the take-off . . .





FAIRCHILD KR-34. A.T.C. 162. Three Place.

PERFORMANCE

Top speed, 123 m.p.h. Climb, 800 ft. p.m. Disposable load, 885 lbs.

SPECIFICATIONS

Wright J-6, 165 h.p. engine and metal propeller. Oleo landing gear. Bendix brakes may be installed at slight additional cost. Air wheels with brakes also obtainable at slight extra cost. Note really complete equipment: Airspeed indicator, altimeter, compass, dash gasoline gauge, booster magneto, tachometer, dual controls, brakes, oil pressure and temperature gauges, cockpit covers, engine cover, logbook, tools, first-aid kit, fire extinguisher, engine instruction book, wired for navigation lights. This plane can also be had with 165 h.p. Comet engine, which alters performance slightly and increases disposable load and economy. Price, with either engine, $6575 flyaway Farmingdale.

FAIRCHILD KR-21. A.T.C. 215. Two Place.

PERFORMANCE

Top speed, 113 m.p.h. Climb, 775 ft. p.m. Disposable load, 885 lbs.

SPECIFICATIONS

KR-21 TRAINER. $4125, Flyaway Farmingdale

Kinner 100 h.p. engine and wood propeller. Oleo landing gear. Bendix brakes may be installed at slight additional cost. Air wheels with brakes also obtainable at slight extra cost. Complete equipment: Altimeter, gasoline gauge, booster magneto, tachometer, oil pressure and temperature gauges, dual controls, engine cover, tools, fire extinguisher, first-aid kit, engine instruction book, logbook, celluloid inspection windows at all control bearing points, detaching pan.

KR-21 SPORTSTER. $4375, Flyaway Farmingdale

Same equipment as the Trainer, plus upholstery, extra oil pressure gauge, compass, airspeed indicator, propeller spinner and cockpit covers.

There is one thrill that is utterly unjustified in flying, and that is the excitement that rises as the ship takes off and approaches the inevitable obstructions at the edge of the field. Fairchild has abolished that thrill by giving its KR Biplanes unusual climbing abilities —775 and 800 feet per minute. You can get off small fields with confidence that the ship will respond to the demands you make of it.

Among those demands is ability to withstand the occasional hard landing such as any pilot makes once in a while. Oleo landing gear, standard on all KR ships, is an additional help in landing. Fairchild KR Biplanes have extra strength, due to the use of the most rigid specifications. Welds are in shear, not tension. Chrome molybdenum steel is liberally used for its combination of strength with lightness; the structure, strong though it is, is not heavy, and disposable loads are high.

You pay no more for Fairchild wider margins of performance. These ships are indeed ideal for the average pilot and his pocketbook. An illustrated booklet giving full information will be sent on request.

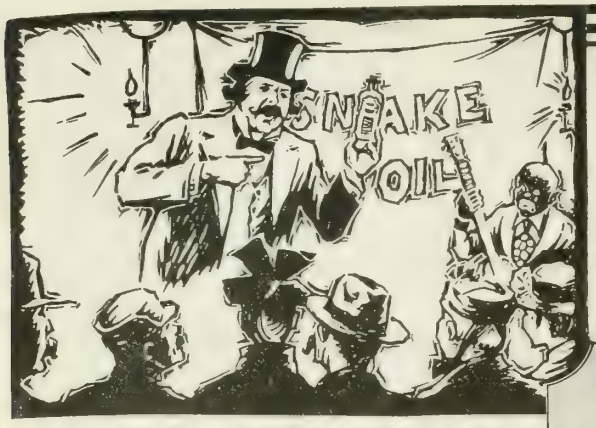
FAIRCHILD AIRPLANE
MANUFACTURING CORPORATION

Farmingdale, Long Island, New York

Plants: Farmingdale, N. Y.; Hagerstown, Md.; Longueuil, P. Q., Canada

Export Offices: 122 East 42nd Street, New York City

Division of The Aviation Corporation



Straight Talks to Airplane Dealers

No. 2



THE old medicine man was romantic . . . picturesque . . . and always attracted a small audience. So with the circus performer in aviation . . . But neither of them built a sound business!

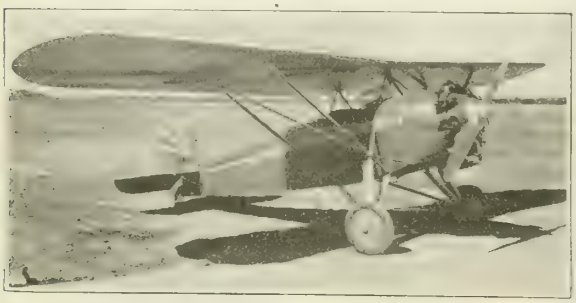
The modern airplane merchandiser is the man who wins success today. He sells modern airplanes—designed in accordance with the newest developments in the science of aerodynamics. He sells them in the modern manner: not for circus performances, but for *sport*, for *training* and for *transportation*.

Inland Sport is a modern 'plane, backed by a merchanding plan that actually helps Inland Dealers make sales. Ask for details of the Inland Dealer Franchise Plan.

INLAND SPORT MONOPLANE

TOMORROW'S PLANE TODAY

Manufactured at Fairfax Field under
Approved Type Certificates No. 259 and 315



Features of the Inland Sport:

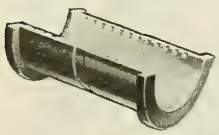
Side-by-side seating . . . Great efficiency—it will carry almost its weight . . . Holds world speed record for light airplanes of first category.

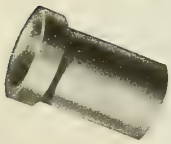
Made by **Inland Aviation Company**
Fairfax Field, Kansas City, Kansas

INLAND SPORT
KANSAS CITY

From Sedans to Section Cars . . .











Federal-Mogul Bearings and Bushings are Used for Dependable Service . .

The Complete Federal-Mogul Line

Bronze Back, Babbitt-Lined Bearings
Steel-Back, Babbitt-Lined Bearings
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Bronze Castings
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Mogul FEDERAL

The selection of Federal-Mogul Bearings and Bushings for motors is not confined to the automotive field. Just as foremost aircraft engines insure dependable performance with Federal-Mogul parts many other motors in diversified industries find Federal-Mogul Bearings distinct necessities to perfect motor performance.

Fairmont Railway Motors, Inc., for instance, have used Federal-Mogul bearings in all of their engines for over two years, and in the words of Mr. W. F. Kasper, Vice President, "Find them entirely satisfactory".

Over half of all railway motor cars are Federal-Mogul equipped Fairmonts, thousands of which are giving splendid service under strenuous conditions in all parts of the world.

On rail, land, water and air—Federal-Mogul Bearings and Bushings are contributing an important part toward lasting, reliable motor operation.

Consult Federal-Mogul engineers for complete information regarding the improvement Federal-Mogul Bearings will make in the performance of your motors.

THE FEDERAL-MOGUL CORPORATION · DETROIT, MICHIGAN

VITAL TO AVIATION





THE MECHANIC

HE is the man who does the work so vital to aviation . . . and most of it behind the scenes. The spot-light of fame seldom finds a mechanic, but his code of service is one of aviation's traditions. His best work is accomplished in the obscurity of hangar shops.

» Yet a mechanic has his moments of glory. His greatest satisfaction comes from the faultless performance of an airplane he has tuned, and his greatest reward when he earns from a pilot this praise: "Man, I never flew behind a sweeter motor!"

» In recognition of the thorough preparation required in this specialized field of aviation, the Spartan School of Aeronautics is operated in two distinct divisions. One trains pilots, the other trains mechanics. Both produce specialists.

» The Spartan mechanic's course is thoroughly comprehensive. It includes a lecture series which steadily advances the student in theory; it includes practical instruction on many types and makes of aircraft engines; it illustrates theory and demonstrates fact with actual experience in both laboratory and shop; and it produces the type of efficient mechanic always in demand.

» A skilled mechanic commands an excellent income. There are no Government physical requirements and the cost of a mechanic's preparation is much less than the cost of preparing for a career as a pilot.

«Mail the coupon for complete information»

SPARTAN SCHOOL OF AERONAUTICS, Tulsa, Okla.

Gentlemen: Please send me your 32-page illustrated booklet describing all Spartan courses.

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SPARTAN SCHOOL OF AERONAUTICS



"ONLY ONE OIL CAN BE THAT GOOD AFTER THAT MUCH BATTLING . . . and that's Quaker State!"

Hours up—long, tough hours—hours that would beat an ordinary oil into a helpless sludge—fail to take the tuck out of Quaker State Aero Oil.

This oil is *oil!* It will fight heat, soothe friction, and give your motor that sweeter, silkier lubrication long, long after an ordinary oil would give up. Why? Because there's an extra quart of real lubrication in every gallon of it, a quart more than you get in the gallon of ordinary oil. That's because of the way Quaker State is refined.

Ordinary refining leaves in every gallon of oil, one quart or more that is of little or no value as a lubricant to your motor—a quart of waste.

But you don't get that waste in any gallon of Quaker State—for Quaker State is not refined in the ordinary way. It is *super*-refined—carried a step further—by an exclusive Quaker State process that removes the quart of waste that ordinary refining leaves in. In place of this quart of waste you get a quart of the finest *lubricant*—a quart *more* than you get in the gallon of ordinary oil. In fact, an *extra* quart!

And every quart in every gallon of Quaker State Aero Oil comes from fighting ancestry—every single quart of it. It's made from 100% pure Pennsylvania Grade Crude Oil, the finest the world produces, the finest "base" an aero oil can have.

Ask for Quaker State Aero Oil at your airport. It's everything an aero oil should be. It gets right to work the moment your motor starts turning over. It stands up longer under heat. It won't grow soupy from hard use—and it will keep any motor singing with a sweeter, smoother hum. Try it!

Other Pure Pennsylvania Products are:

QUAKER STATE MEDIUM MOTOR OIL

QUAKER STATE MEDIUM HEAVY MOTOR OIL

QUAKER STATE HEAVY MOTOR OIL

QUAKER STATE COLD TEST

QUAKER STATE TRACTOR OILS



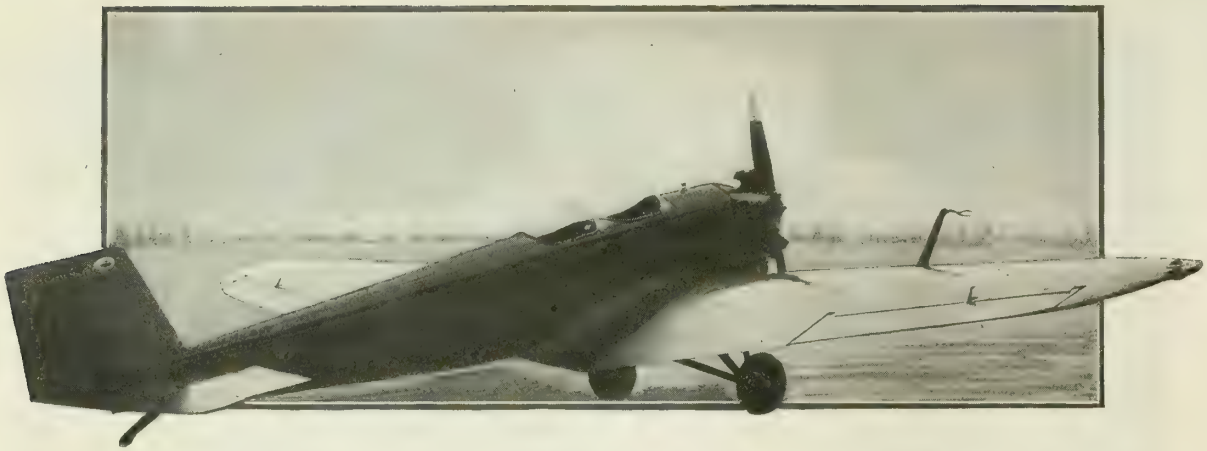
QUAKER STATE OIL REFINING CO., OIL CITY, PA.

QUAKER STATE

TRADE MARK REG. U. S. PAT. OFF.

AERO OIL

Get that extra quart in every gallon



THE AEROMARINE KLEMM OUTCLASSES ALL OTHERS

THERE'S speed written in the straight, flowing lines of the new Aeromarine Klemm. There's "stand-up-and-take-it" ruggedness under its sleek, glistening surface. And there's a constant reserve of smooth, certain power harnessed in the nose of this favorite sport and training plane.

To the flying school operator—the long distance commuter—sportsman—owner—to every flier, the Aeromarine Klemm brings a new, reliable and economical performance. Born as a glider and inherently stable, it flies itself. Responsive, safe, powerful, comfortable . . . the Aeromarine Klemm outranks anything in its class—in both flying performance and price.

More outstanding than beauty, stamina, speed or power, though, is the unheard of economy of Aeromarine Klemm's operation. Hourly flying costs much lower than those of the average training or sport plane mark this most modern of all light airplanes as the predominant buy for those who are mindful of flying expenses.

Here, for instance, is a typical example of Aeromarine Klemm's day-in-and-day-out economy. Plane number 9177, used as a training plane by the Airview Flying Service at Red Bank, New Jersey, cost $3.20 per flying hour, based on all expenditures from August 25th, 1929, to March 29th, 1930. Hourly cost was computed as follows: 987 gallons of gasoline at 30c., $296.10; 18 gallons of oil at $1.60, $28.80; service, repairs and cleaning at $1.50 per hour, $334.50; replacement parts, $52.84. Total, $712.25 . . . divided by 222 flying hours, equals $3.20 per hour. That's *real* economy for you.

A group of nine students soloed in this same plane in an average of 4½ hours each!

For primary training the AKL-25, powered by the Salmson 40 h.p. engine, sells for $3350, flyaway, Keyport, N. J. For secondary training and for cross-country work, the AKL-60, powered by the LeBlond 70 h.p. engine, sells for $3500, flyaway, Keyport, N. J. Equipped with pontoons and powered by the LeBlond engine, the AKL-60 sells for $4500, flyaway, Keyport, N. J.

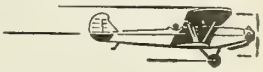
Dealers and distributors are invited to investigate our profitable franchise and territorial assignments. Write for complete data and information on our sales plan.

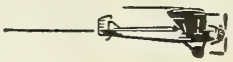


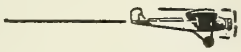
AEROMARINE KLEMM CORPORATION

GENERAL MOTORS BUILDING 1775 BROADWAY NEW YORK CITY









Here is positive proof that Parks-trained men are in constant demand

PATRONS ARE REQUESTED TO FAVOR THE COMPANY BY CRITICISM AND SUGGESTION CONCERNING ITS SERVICE

CLASS OF SERVICE

This is a full-rate Telegram or Cable-gram unless its deferred character is indicated by a suitable sign above or preceding the address.

WESTERN UNION

NEWCOMB CARLTON, PRESIDENT J. C. WILLEVER, FIRST VICE-PRESIDENT

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DL = Day Letter
NM = Night Message
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LCO = Deferred Cable
NLT = Cable Letter
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The filing time as shown is the date line on full-rate telegrams and day letters, and the time of receipt at destination as shown on all messages, is STANDARD TIME.

Received at

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OLIVER L PARKS=

ALWAYS MAINTAINING LOCKHEEDS HIGH STANDARD QUALITY PRODUCTION WE HAVE EMPLOYED ONLY PROVEN SEASONED MECHANICS STOP HOWEVER AFTER EXHAUSTIVE STUDY AND OBSERVATION YOUR SYSTEM COMPLETE INSTRUCTION AND PERSONNEL OF STUDENT BODY POSITIVE LOCKHEED CAN ABSORB SOME OUTSTANDING STUDENTS TO MUTUAL ADVANTAGE STOP AMAZED AND GRATIFIED COMPLETENESS AND THOROUGHNESS CURRICULUM OFFERED STUDENT BODY STOP THIS YOUR AUTHORITY OFFER EMPLOYMENT UPON ARRIVAL BURBANK FOUR STUDENTS YOUR SELECTION=

LOCKHEED AIRCRAFT CORPORATION
CARL B SQUIER.



(Above) *Facsimile of telegram recently received from Mr. Carl B. Squier, General Manager, Lockheed Aircraft Corporation.*

(Left) *Student and instructor repairing a Wright Whirlwind engine at Parks Air College.*

EVERY young man who is interested in aviation as a life work should read carefully the telegram reproduced on this page.

The Lockheed Aircraft Corporation is only one of the many concerns in the aviation industry which recognize the supremacy of Parks training and are *anxious to give profitable employment to Parks graduates.*

Remember this when considering a school for your own training, either as a pilot or an airplane and engine mechanic. The recommendation of your school at graduation *means everything to you in getting a good job.* And a recommendation from *Parks* will open doors to you which might otherwise be closed—because Parks has an international reputation for giving the most *complete, thorough, sincere training obtainable anywhere.*

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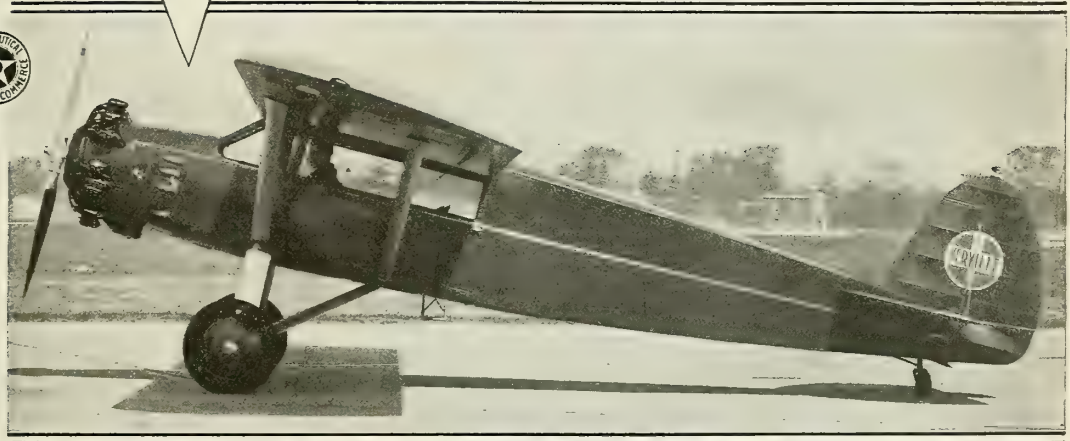
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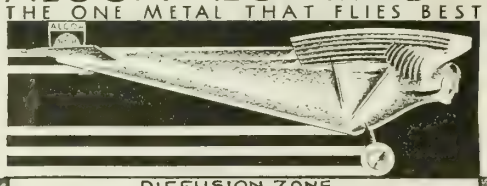
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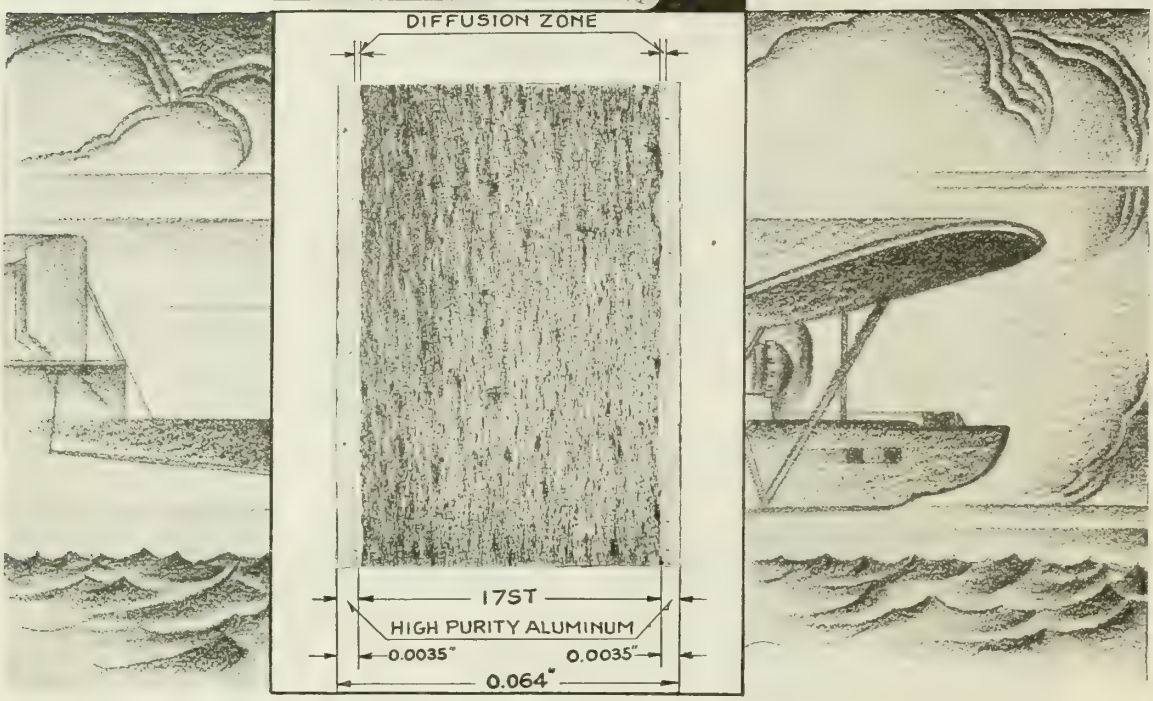
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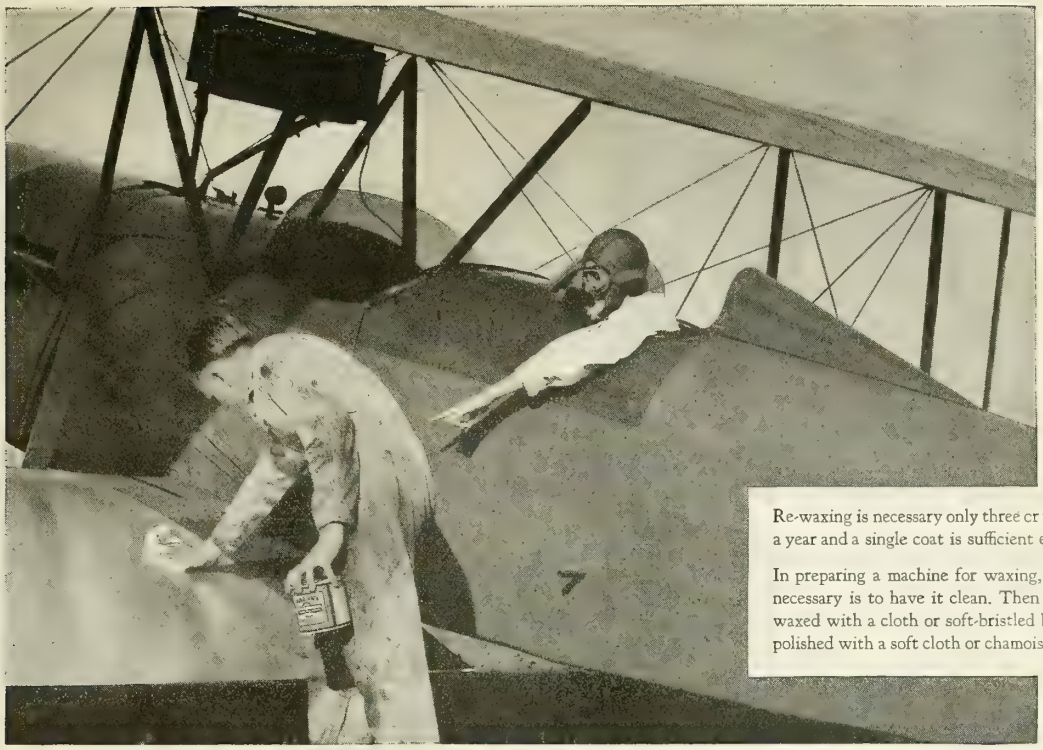
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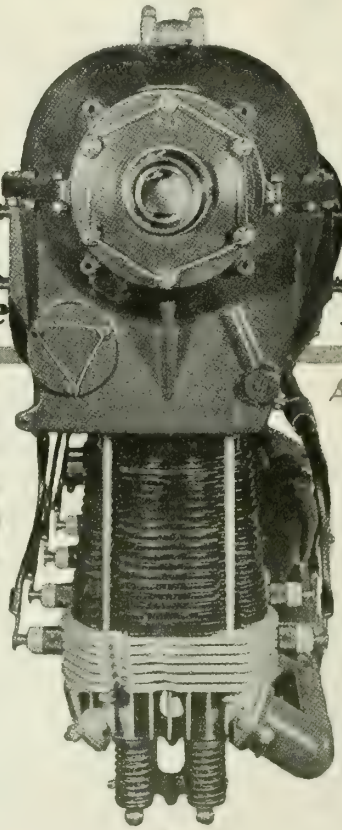
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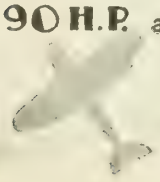
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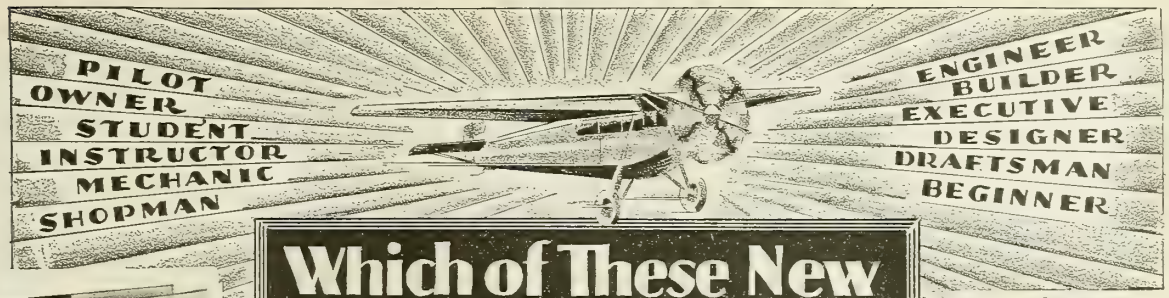




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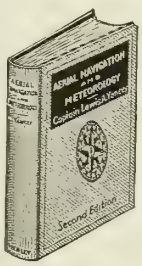
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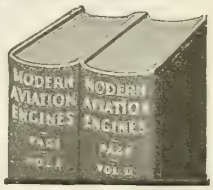
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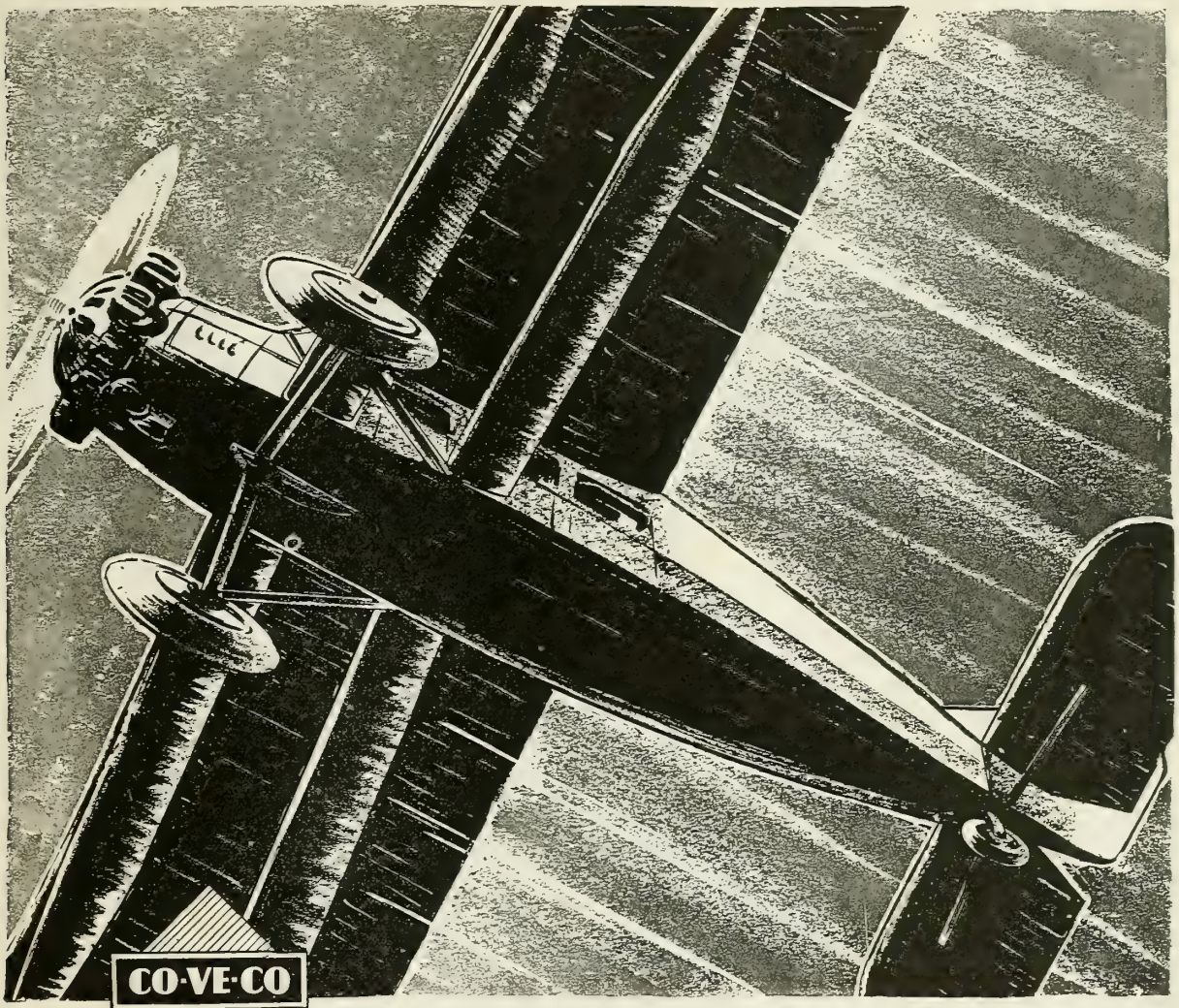
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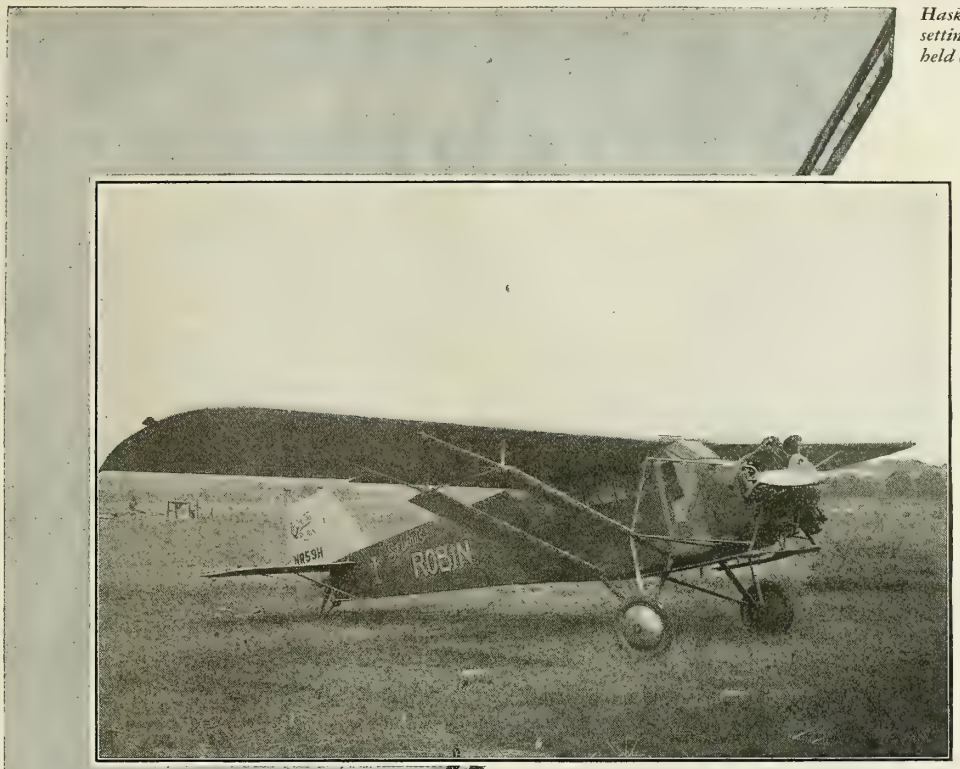


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Airview of Mount Arayat rising above the cane fields of Luzon in the Philippines. According to a modern facetious legend, Noah's Ark, resting on this peak after the flood, left its imprint.

A FLYING TOUR of the PHILIPPINES

James Hoeck

"ORIENTAL America" is becominb air-minded. One of the most primitive lands in the world, on the opposite side of the globe from the sovereign country, the Philippine Islands have more highly developed aviation than some sections of the United States. There is one essential difference from flying at home, however—in the Philippines, civilian aviation has been practically non-existent, and all the credit for blazing air trails belongs to the Army and the Navy.

Security of flying in this equatorial region has only been attained by overcoming such obstacles as obtain in few other parts of the world, and accomplishments of American fliers in the tropics, thus far virtually unheralded, have been attended by hazards equal to those surrounding the more spectacular dashes across the Arctic.

Equally unnoticed heretofore are the beauties of the Philippines viewed from the air, the tropical glory of these South Seas Islands—exotic panorama of mountain peaks, jungles and volcanoes, multi-colored coral fringed islets, river gorges and waterfalls, rice paddies and cocoanut plantations, old Spanish forts and churches—expanded and transmuted to richer proportions from the cockpit of a plane a mile or two aloft.

The aerial conquest of the Philippines has been achieved entirely within the last eight or nine years. In this brief period, three large air bases have been established near Manila, with subsidiary landing fields elsewhere; mapping all the uncharted areas from the air has been accomplished; airplane surveys have detected faults so that cables could be laid with greater security from earthquakes; every day a pilot soars to 10,000 feet to record data of value in issuing typhoon warnings; circuits of the islands over 2,000 miles have been made regularly to carry mail, and planes have transported explorers to inaccessible parts of the islands.

Whereas a few years ago a plane was an unheard-of novelty in this primitive country, today scarcely an hour passes in Manila without the appearance of a ship in the skies. It is a remarkable chapter in the development of aviation.

The Philippines afford no natural landing fields. Most of the island country is forested and mountainous and the level land is nearly all under cultivation. When attempts have been made to build emergency fields, torrential rains rendered them unfit for use in a few weeks. Waterways for forced landings abound, but an aviator who makes a descent with a dead motor in a jungle swamp or along a desolate coast is frequently lost. Storms arise suddenly and typhoons lash the northern islands in certain months. Fogs and squalls are common at all times. Despite these dangers, Army and Navy pilots have flown more than 125,000 miles in the past year without a fatality.

The 4,000 islands of the Philippines stretch, in the contour of an elongated kangaroo, from about the twentieth parallel north of the equator to within four degrees of the "the line." Formosa is only one hundred miles to the north, and the southernmost Philippines overlap the shoulder of Borneo.

Camp Nichols, on the outskirts of Manila, main aviation center, is the starting point for cross-country flights. Lacking emergency fields, the planes make spiral climbs tc 2,000 feet before leaving the security of the camp and nudging out over Manila Bay.

The route north is directly over Manila, over the fertile plains of Pampanga and the foothills of Nueva Ecija, over the mountain divide of Central Luzon and thence down the Cagayan Valley to the Pacific.

In history books Manila Bay is treated as a small ocean inlet. It is only from the vastly improved perspective of a plane that one gets a correct impression of its size—a vast inland sea easily seventy-five miles across, with the island of Corre Igidor, fortified Gibraltar of the bay, rising out of the ocean to block the entrance, like a black whale.

Over the tail, in one corner, one sees the slender Cavite peninsula, planted in the bed of the bay like a tiny fish-hook. On its tip, site of an old Spanish marine base, the Navy wireless antennae rise like tooth-picks. Overlooking this glistening panorama, one can easily reconstruct the battle of 1898—how Dewey's fleet on May 1st steamed through the portals, the smaller Spanish gunboats maneuvering for a futile defense, a few broadsides as the squadrons approached, some sunk and others scuttling for safety; and between Cavite and Manila, several ran aground, the submerged hull of one still visible

It was along this same shore that American volunteers landed on a rainy August day and advanced to attack Manila. Here, too, centuries ago, Chinese and Moro pirates massed for assaults on the Spanish capital.

Manila today, city of a quarter million, forms a semi-circular blot on the coastal plain between the bay and the mountains behind. It is like half a wheel, the Walled City at the hub and the broad avenues built since '98, the spokes. The winding Pasig River cuts sharply through its center like the veins in the temple of an old man.

As the plane cruises on at ninety miles an hour, we pass over the bay front which has made Manila one of the most beautiful cities in the world. The white buildings, palm-fringed esplanade and wide Luneta plaza faintly resemble Buenos Aires and render it deserving the soubriquet, "Pearl of the Orient." Just beyond the green tablecloth of the plaza, at the mouth of the Pasig and stenciled on the background of the sunken gardens curving around its bastions, is the Walled City, relic of the centuries. Its red and gray tile roofs and crenelated walls seem a model village built of sand, or even more like the small Cite de Paris in the Seine. Otherwise, Manila from the air is a sea of roofs, with a golden girdle of country about.

Slowly the horizon changes as the plane speeds northward along the military air highway. We pass the shipping center off the mouth of the Pasig, where ocean liners appear as tiny cat-boats.

On over the bay, the coast north of Manila is eaten away, as if by acid, a lacework of canals or festering rice paddies. It was through these nipa swamps that the Spanish governor escaped at night in a skiff when the English captured Manila in 1762.

Beyond this vast bog, which reflects the sunlight so dazzlingly, on the solid land of pampanga province is the town of San Fernando. Provincial towns in the Philippines are picturesque from nearly any angle, and none of this is lost from the air. Always there is the venerable cathedral, shepherding about it cluster on cluster of nipa or frame houses on stilts, and galvanized iron roofs everywhere visible through the umbrage of cocoanut trees.

The country about is square on square of green cane fields. Out of the plain, in shy and knock-kneed solitude rises the inescapable landmark of Mt. Arayat, with a cradle-like bite in its top, where, in the modern facetious legend, Noah's Ark rested after the flood and left its imprint. Beyond is a yellow scrambled scenery, painted dull gold by the sun, part of the Sierra of northern Luzon.



Mt. Kanabuy, the highest peak along Balete Pass

Near this aviator's guide-post is the second airdrome, Clark Field, whence the ship heads for the mountains and starts climbing for the jump over Balete Pass. Past the foothills of Nueva Ecija, one soon crosses the saw-tooth ridges that begin the range.

Then, indeed, at 6,000 feet, one feels on the "roof" of this tropical world. Everywhere about is a jumbled mass of crags and towering peaks, snow-capped in winter. The earth seems torn and twisted by some malevolent giant, the "pass" merely a depression in this rocky wilderness above which the insect plane moves with hasty caution.

At the end of the tortuous and barren valley, one comes in view of the headwaters of the Cagayan River, gradually widening into the great basin of the "Mississippi of the Philippines"; and as the plane proceeds over its vast alluvial plain, the serrated tobacco plantations appear and an occasional boat is seen on its meandering course.

Still thirty or forty miles from the mouth, the coast of the Pacific rises out of the horizon and the lines of surf eating away at the sandy shore can be delineated. Towns glide by beneath; soon the huddle of roofs that is Aparri is visible. Completing what would be a three-day journey by boat from Manila, the plane glides down for the sandy stretch near the town between three and a half and four hours after leaving Camp Nichols. Pursuit planes do it in less than three hours.

In the more protracted excursions, squadrons of seaplanes are used. Flights include long hops over ocean stretches when land is almost out of sight.

The first leg on the round-the-island tours is from Manila south to Mindoro, most desolate island of the group. On its southern tip, however, near the town of San Jose, is an excellent landing field and a sheltered bay for seaplanes. It is here that planes flock in season for the pilots to hunt the rarest game in the world, the tamarao, or wild carabao.



Jolo, Jolo, as it appears when viewed from the air

My flight to Mindoro contributed a thrill or two. The first came shortly after climbing to 7,000 feet, where vision was widened to nearly a hundred miles and it seemed as though the whole of southern Luzon lay beneath. Like a vast sheet of ice, the China Sea stretched off to the west and on the other side, pressing against the narrow neck of land beneath us, was another glacial expanse, Lake Laguna, almost as large as Manila Bay to the north, its farther shores dimly discernible through the flocculent wisps of clouds that floated between earth and plane. The lighting effects at this height in the tropics are like a dozen sunrises and sunsets dissolved into one.

Ahead and to the south, its top level with us, was the mighty pillar of Mount Maquiling, shrouded in mist; directly beneath, a patchwork of rice paddies that slowly changes to forested hills. Those rills of clouds that danced so prettily in the sunlight, however, foretold a certain danger, for they were closing in on the pass between Mount Maquiling and Mount Taal through which the planes must



Aerial view of Manila Hotel at Manila, P. I.

fly. The pilots played tag with the clouds, dodging over miles of space for fear of losing bearings or colliding in the opaque masses. It was a game requiring skill and judgment in estimating the velocity and direction of clouds and the speed of the plane. Traveling by air, one uses mountain-tops for guide-posts and valleys fifty miles wide for roads. Literally you wear seven-league wings.

After dodging one or two lines of clouds, we plunged into an open lane, a solid white wall ahead, but with a break to the right round the shoulder of a range. The land, too, came uncomfortably close as we reached the ridge, and once round the "corner," with the crater lake of Mount Taal coming into view, the ships were only a few hundred feet above ground. Filipinos, working on primitive mountain holdings, ran to their nipa huts for shelter as the great "birds" flew by. The volcano blew off its top in 1911, with 400 persons killed and several towns destroyed. Now a warning roar emanates from some subterranean cavern every time there is to be an eruption, so these simple mountaineers are apt to misinterpret the sound of an airplane motor and flee.

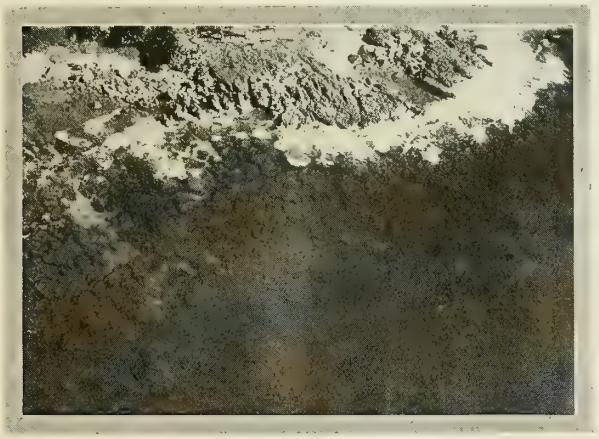
Taal crater lake, sunk in a depression in the mountains, is a perfect specimen, and in its center is the shattered cone of the volcano, housing yet another tiny lake. So

precipitous are the walls of the first lake that the moment the wings seemed nearly to be brushing the treetops and the next we were looking down 5,000 feet to the water below. Turquoise blue are the waters of this unruffled lake, and as we traversed its few miles all too quickly, the plane passed directly over the heated volcanic cone.

From Lake Taal a twenty-minute flight carried us across the windy Verde Island channel between Luzon and Mindoro. Here again we passed through a narrow opening between mountains and this time the way seemed completely blocked by clouds. But the planes sailed straight up a side alluvial valley, with peaks towering on either side, and after a dash round a bank of clouds and racing to beat another rolling white mass, the way ahead cleared for a few miles. Columns of black clouds appeared on either hand, and, although the plane was roaring on full-throated in the sunlight, we could see a rainstorm at one side and an occasional flash of lightning—a weird effect.

Another quarter of an hour and we were over the rocky divide and out in full view of the sea on the opposite side of Mindoro. Looking back through the pass, we could see the clouds gathering for a rainstorm in which a plane would have been hopelessly lost. We had come through just in time.

Flying down the Mindoro coast was a strange ex-



Coral reefs along the shore of Fuga Island, P. I.

perience, for one feels here completely alone with a wild and forbidding nature. For more than fifty miles the plane passed over a jungle wasteland, broken up by boulders and rocky ledges and dry beds.

There was a touch of beauty in this monotonous waste. Patches of coral reefs, violet and green and yellow, lined the entire coast, and the white coral beach was in places so straight the shadow of the plane danced right along it for minutes at a stretch. So smooth was the air one could stand upright in the cockpit without discomfort. The only hardship of the trip, in fact, was the burning glare of a tropical sun.

After crossing the peninsula, we sighted the tiny hamlet that was our objective. The buildings are grouped about a sugar mill operated by the Mindoro Sugar Company, financed by Havemeyer capital and occupying more than 100,000 acres on this level corner of Mindoro. The landing field, marked only by a flag in one corner and a railway track alongside a turf meadow, is a natural air base. One after another the six planes circled round and put down. That leg finished, a two-day journey by boat was accomplished in less than two hours.

For the remainder of the round-the-island flight, I call upon the experiences of three pairs of fliers who set out



The crater lake of Mount Taal in the Philippines

in seaplanes for this jaunt, visiting two large industrial centers, Iloilo and Cebu, and circling most of Mindanao, then back via the eastern islands of the group to Manila. The 2,000-mile trip required about ten days.

Setting out from Corregidor, the seaplane base, the same route is followed to Mindoro, where, on the flight in question, the planes stopped in Mangarin Bay, to be met by "vintas" or canoes, bearing gas for refueling. Leaving Mindoro behind, they jumped eastward across the Visayan Sea, that island-dotted water often compared to the "Inland Sea" of Japan. Rounding the triangular apex of the island of Panay and passing the white coral cliffs of Ventura, the planes headed south for Iloilo, leading sugar port of the Philippines, and city of 100,000.

Interned at Iloilo by a day of rain, the planes took off next day to cover the other half of the distance to Mindanao. But shortly after getting under way, a rainstorm made going heavy. The coast of Negros, easily visible at the outset, became blurred. It was a choice of a probable forced landing on the northern uninhabited coast, or a dash for safety in a known harbor to the south. The aviators chose to seek protection in the poorly-guarded harbor near Silav, off the intended course.

The planes came down safely, the men taken ashore in small boats manned by constabulary, who everywhere had instructions to help, and the ships were anchored. But during the night the storm increased, one of the planes parted its moorings and drifted towards the rocks. A guard saw the riding light moving toward shore, and set out to avert disaster, but before he could reach the plane, it had hit a submerged wreck (*Continued on page* 198)



Looking northeast over Bambang Nueva Vizcaya

BUYING AMERICAN AIRCRAFT IN FOREIGN LANDS

Leighton W. Rogers

Chief, Aeronautics Trade Division, Department of Commerce

THE Department of Commerce representative in "Jovellanos," known as the American commercial attaché at the American embassy, hears from some of his many contacts with the business life of the country that Señor José Astrada is considering the purchase of an airplane to enable him more easily to go back and forth between his city office and his ranches. He immediately sends one of his staff, probably a trade commissioner, to call upon the farsighted Señor Astrada. The trade commissioner gives that gentleman catalogues of various makes of American airplanes and discusses with him the service which the plane to be purchased will be expected to render. Usually Señor Astrada is interested. He has heard of the record flights of American planes and pilots—Lindbergh, Brock and Schlee, Doolitte, Hawks, and many others—and he wants more specific details of the construction and performance of the planes and engines used in these flights, as well as of any others that the trade commissioner may consider adaptable to the purpose.

The trade commissioner hurries back to the office, and a cablegram is dispatched to the Aeronautics Trade Division of the U. S. Department of Commerce in Washington:

"Buforcom, Washington

"Number forty-four José Astrada four eight one Boulevard Santa Rosario considering purchase four to six passenger single engined cabin plane preferably three hundred horsepower for service between 'Jovellanos' and his estates range four hundred miles maximum altitude landing fields six thousand feet. Stop. Cable quotations."

Immediately upon receipt of this message in the Aeronautics Trade Division at Washington, a telegram is sent by that office to all district offices of the Department where there are manufacturers of airplanes which might be suitable.

"Señor José Astrada four eight one Boulevard Santa Rosario, 'Jovellanos,' considering purchase four to six passenger cabin plane three hundred horsepower range four hundred miles maximum take off, altitude six thousand feet. Stop. Notify companies your district if interested mail specifications and performance data to him quoting best price also copies to this office for forwarding through commercial attaché. Stop. Wire quotations for transmission and advise this office action."

When the replies are received, the Aeronautics Trade Division cables its "Jovellanos" office naming the U. S. companies which have signified their interest, transmitting their c.i.f. quotations, and citing what action they are taking. It is suggested that the commercial attaché follow the transaction, and advise Señor Astrada to do nothing further until the catalogues, specifications and performance data arrive from the various American companies; also that similar data are being sent him for transmittal to Señor Astrada in case the direct company-to-customer mailing is delayed or does not arrive. Of course, those American companies which have agents in the country in question are either notified at once by the commercial attaché or else by the American company as soon as word has been received from the Department of Commerce.

It is at such times as this that the question often arises as to agents for firms not already having one in the country involved. A manufacturer writes to the Aeronautics Trade Division saying that so-and-so in "Jovellanos," perhaps in connection with this very sales opportunity, has applied for the company's agency in that territory. Does the Division know anything about him? Will he make a good agent?

The Department has long been prepared for requests of this kind. The inquiry is referred to the Commercial Intelligence Division which has for years maintained a current file of some 300,000 names of foreign dealers, agents, importers, etc., in all parts of the world. A report comes back to the Aeronautics Trade Division containing checked facts which make it clear that the firm mentioned might be undesirable (or desirable) as an agent for an American aircraft company, but containing a suggested list of from three to six names of firms which would qualify. Pertinent data are given about each one to assist the U. S. manufacturer to make his decision. This information is sent to the aircraft company.

Meanwhile, the commercial attaché in "Jovellanos" is keeping his eye on the prospective sale of the American airplane. It is at this stage of the transaction that the function of the Aeronautics Trade Division and the field representative changes from that of promoter to counsellor. The Department is authorized to discover opportunities for the sale of American products abroad, to find new markets and to expand existing ones, but it cannot actually do the business. Once the overseas buyer and the American seller have been brought together through its service, it can only stand by to render assistance and counsel.

Some one from the commercial attaché's office maintains contact with Señor Astrada and with the agents, if any, who are interested in the business. If the arrival of the specifications, performance data, and quotations from various American firms is being awaited. Señor Astrada, in the meantime, is kept supplied with items of interest about American aircraft.

Eventually, on the basis of the activities of agents on the spot or of the data which have arrived, Señor Astrada narrows his choice down to, say, four American planes. He does not wish, on the basis of the facts at present known to him, to make the decision without further assistance from the Department of Commerce. He even wants its specific recommendation. This has happened and is likely to happen in the future. The Aeronautics Trade Division receives a cable from the commercial attaché naming four planes and saying that Señor Astrada wants the Department's recommendation. This, of course, cannot be given. The Department has no recommendation to give. There are, however, other facts which may be brought to bear upon the matter with practical, helpful results.

It is observed that one of the four planes on Señor Astrada's list is not manufactured under an Approved Type Certificate and that, therefore, it cannot get the Certificate of Airworthiness for Export issued by the Department of Commerce.

Without an Approved Type Certificate it is impossible to obtain the Certificate of (*Continued on page* 190)

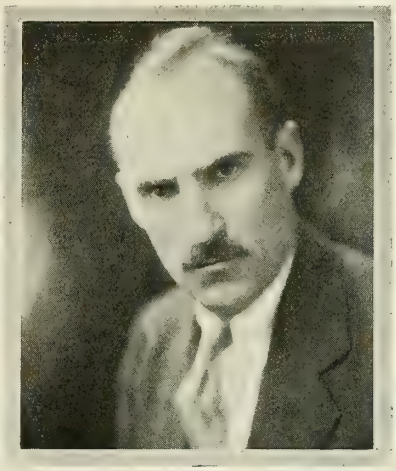
THE CHAIN SYSTEM OF FLYING SCHOOLS

C. S. "Casey" Jones

President, Curtiss-Wright Flying Service

A CHAIN of flying schools stretching across the country, each school helping and supplementing the work of the other, and all directed by a centralized management, has several advantages over the schools of the past. During the present year, flying instruction is being placed on a more practical and scientific basis than ever before, largely because of the development of the chain flying school system.

The most obvious example of a chain of flying schools is the system of the Curtiss-Wright Flying Service which operates schools at forty bases throughout the United States. The system dots the country with schools where students may receive flying instruction, and operates nearly half of the schools approved by the Department of Commerce. During the year 1929 this chain of schools gave instruction to 2,000 students without one serious mishap. This record of safety and service is, we believe, directly bound up with the advantages derived from operating flying schools in a comprehensive chain. This system has enabled Curtiss-Wright to place in each of its flying schools the finest of training planes and competent instructors, all of whom are graduates of our own instructors' school, and has made it possible to use a standardized method of instruction in accordance with a technique worked out by experienced aeronautical experts and flying instructors.



C. S. "Casey" Jones

As a subsidiary of the Curtiss-Wright Corporation, the Flying Service can make use of fields owned by the Curtiss-Wright Airports Corporation and other fields controlled by the parent organization. The Curtiss-Wright flying schools operate on flying fields of 125 to 520 acres. In almost every instance the field is the largest in the locality. Located on the field is at least one large modern hangar which contains offices, a machine shop, schoolroom, student lounge room, showers and other improvements. In several of the larger cities, three to six hangars are operated. They are equipped with restaurants, ladies lounge rooms, sleeping quarters for visiting pilots, observation balconies, etc., in addition to regular students' quarters.

The Curtiss-Wright airport at Chicago is one of the largest airports and on it has been erected what is probably the largest airplane hangar in the world. This building is the size of five of what are ordinarily called large hangars. By an ingenious system of sliding doors, this single hangar building can be divided into three or five hangars for storage or heating purposes. The Chicago airport represents an expenditure of more than $3,000,000.

At Valley Stream, Long Island, is our main airport for metropolitan New York. There are six large modern hangars located there in addition to a service hangar, restaurant and other buildings. Metropolitan New Yorkers also take flight instruction at our airport in northern New Jersey near Caldwell and at our seaplane school at Port Washington, Long Island.

San Francisco, Los Angeles and Miami are other cities which are served by more than one Curtiss-Wright airport. St. Louis, Milwaukee, Baltimore, Oklahoma City and Louisville are other locations of our largest airports which have the distinction of being the latest development in modern design and are very near the heart of the city. Dallas and Fort Worth are served by an excellent airport, ideally situated midway between them and easily reached by good roads and fast electric trains.

The use of such fields by schools of the Curtiss-Wright Flying Service represents, of course, an immense economy. Any large system of schools economizes in other important respects. It can buy its equipment in quantity for cheaper prices. It can transfer equipment from one point to another wherever it is most needed.

This question of economy goes out in one other direction. In the long run economical operation of schools depends on their organization and direction. A large school system can afford to employ the most experienced organizers and executives in the fields. Although the schools of the Curtiss-Wright Flying Service have their own particular organization under a national director of flying and a national director of schools, they also share in the organization of the central office. The management, centralized in New York, distributes its instructions to the general managers in charge of the eastern and western districts of the United States. These men direct the managers of the forty bases, who in turn work in coöperation with all instructors. The closely knit organization of this personnel leads to the direct execution of orders from headquarters, and the fact that there is a headquarters allows the school to be run according to a carefully planned, uniform policy, which has as its basis the safe and thorough instruction of all flying students.

Among more than 2,000 students taking training at Curtiss-Wright bases are all types of persons from the different walks of life. There are fifty-eight women from every class of society learning to fly at Curtiss-Wright airports. Last year, while Mrs. Charles Augustus Lindbergh was taking flying lessons at Valley Stream, a waitress from a nationally known system of restaurants was learning to fly.

It is at Valley Stream that the flying cops of the New York Police Department are receiving their instruction. Seven police chiefs of various cities are going to Curtiss-Wright schools, and five mayors from five other cities have been influenced by the air-mindedness of their towns to take flight instruction.

As for equipment, it is equally obvious that a large organization can purchase the best possible airplanes. The standard instruction of the Curtiss-Wright Flying Service Schools is the Fledgling, a plane that was designed with the thought of strength and usefulness rather than econ-

omy. It was chosen as the standard training plane of the Navy out of a large number of competitors.

For the commercial pilot's course, instruction is given in five types of open and closed planes, and for our transport pilot's course, at least three additional types are used, including special night flying and one Class II plane. The Curtiss-Wright Flying Service operates a number of trimotored planes and amphibions for sightseeing and short airlines. Whenever possible transport students are allowed to act as co-pilots on these multi-motored planes.

The use of dependable type of training planes under the direction of capable and experienced instructors has built up a high degree of confidence in Curtiss-Wright training methods. As a consequence of our reputation for safety, insurance for our students has been reduced to an extremely low rate. In order to take advantage of every possible protective measure for those who have imposed their confidence in us, arrangements are made to provide insurance without cost to each student enrolled.

The quality of instruction goes back always to the competence of the teacher. Because of its resources a large flying organization is in a position to give its instructors a unified course of training in the art of teaching others how to fly.

An example of this is the school for training flying instructors which we maintain at Grosse Ile, Michigan. There they are taught by "Bill" Winston, Lindbergh's instructor, the Curtiss-Wright standardized system of instruction, which in itself is designed to teach the student to master the air, not merely to learn to fly. Instructors go through the school for their final training as a matter of routine, and every instructor is a graduate of a carefully planned training system. Besides running the school at Grosse Ile, Mr. Winston is periodically touring all of the schools of the Curtiss-Wright system keeping direct contact with the instructors he has trained. Mr. Winston is now on a tour of our bases which will take him over 12,000 miles. He inspects the work of instructors whom he trained and applies new practices wherever necessary.



The Curtiss-Wright hangar at Los Angeles Airport

Moreover, a chain system of schools will have this further advantage so far as instruction is concerned: Its men will be continually comparing notes as to the best methods of teaching just as teachers of the public schools aid each other in informal discussion. Through this give and take of advice and through supervision, the method of instruction is constantly being improved in a large school system.



Curtiss airport at Pittsburgh as it will appear when completed



Modern building of the Curtiss-Wright school at Columbus

The Flying Courses

This system of training employed at the various Curtiss-Wright schools can perhaps best be appreciated from a review of the flying courses offered.

The Private Pilot's Course. This course is literally a flying start for young men who plan to take up aviation as a profession. It also gives flight training for sportsmen, engineers, business men and salesmen who desire to fly either for pleasure or to save valuable time. The Private Pilot's Course includes the Primary Ground School Course teaching the fundamentals of aviation. The ground instruction consists of twenty-four sessions covering such important subjects as theory of flight, instruction on airplanes and engines and air commerce regulations. Actual flying instructions may be taken while attending ground school. The first ten hours are devoted to dual instruction including taxying, take-offs, turns, landings, and efficient handling of an airplane on land and in the air. The Fledgling training plane is used in this course. After the student is thoroughly instructed in recovering from stalls and spins, and when there is absolutely no doubt about his ability to control the plane in any position, solo flying is begun. The solo flying is carefully supervised, and frequent check flights are given to determine the student's progress in smooth handling of the controls. The student is again checked when he finishes the course and is then ready to take the Government tests for a private pilot's license.

The Commercial Pilot's Course. It has been determined by the United States Department of Commerce that the fifty hours of actual flying time required for this course are both necessary and adequate to qualify a person to earn money as a commercial pilot. The successful completion of this advanced course entitles the student to take the examination for a limited commercial license, which license permits him to carry passengers for hire within a limited area, demonstrate and test planes, and act as co-pilot on passenger transport lines. The advanced instruction includes steep turns, spirals, figure eights, cross-wind and sideslip landings, landing in and taking off from small fields, and enough aerobatics to insure complete mastery of a plane under any conditions. In addition to the Fledgling, four other approved and standardized open-cockpit and cabin planes are flown. Provision is made for those holding

the private pilot's license to add the required additional thirty hours of advanced flying instruction to their previous training in order to obtain the commercial pilot's license. All of the solo flying is under the helpful guidance of the instructor who accompanies the student on frequent check flights to make certain that he is progressing satisfactorily. Self-confidence, precision and instinctive coordination at handling the plane is the result. Cross-country flying experience is an important feature of this course. Both open and cabin planes are used on trips to surrounding cities with airport facilities. On these cross-country trips, the student flies the plane, checks the course with instruments and maps, and keeps a log of the trip.

The Transport Pilot's Course. This course, with its 200 hours of required flying time, is a thorough preparation for obtaining the highest Government flying license. It is recommended for those who plan to make aviation a career. Transport pilots may pilot any type of licensed aircraft, and carry passengers for hire in aircraft within the types and classes specified in their licenses.

In this course, the student covers everything included in the Private Pilot's Course and the Commercial Pilot's Course, together with more advanced ground school and shop training, and 150 additional hours of flying. Flying by instruments is mastered by extensive cross-country work in open-cockpit and enclosed cabin planes. This is followed by ten hours of intensive training in night flying. Instruction is given in aerodynamics, construction of engines and airplanes, rigging, inspection, maintenance and repair, radio and its uses in aeronautics, navigation and weather forecasting. Students in the Transport Pilot's Course have the opportunity to become familiar with the inner organization of flying fields and the operation of transport lines. They have contact with those who have been active in the industry from the early stages of its growth.

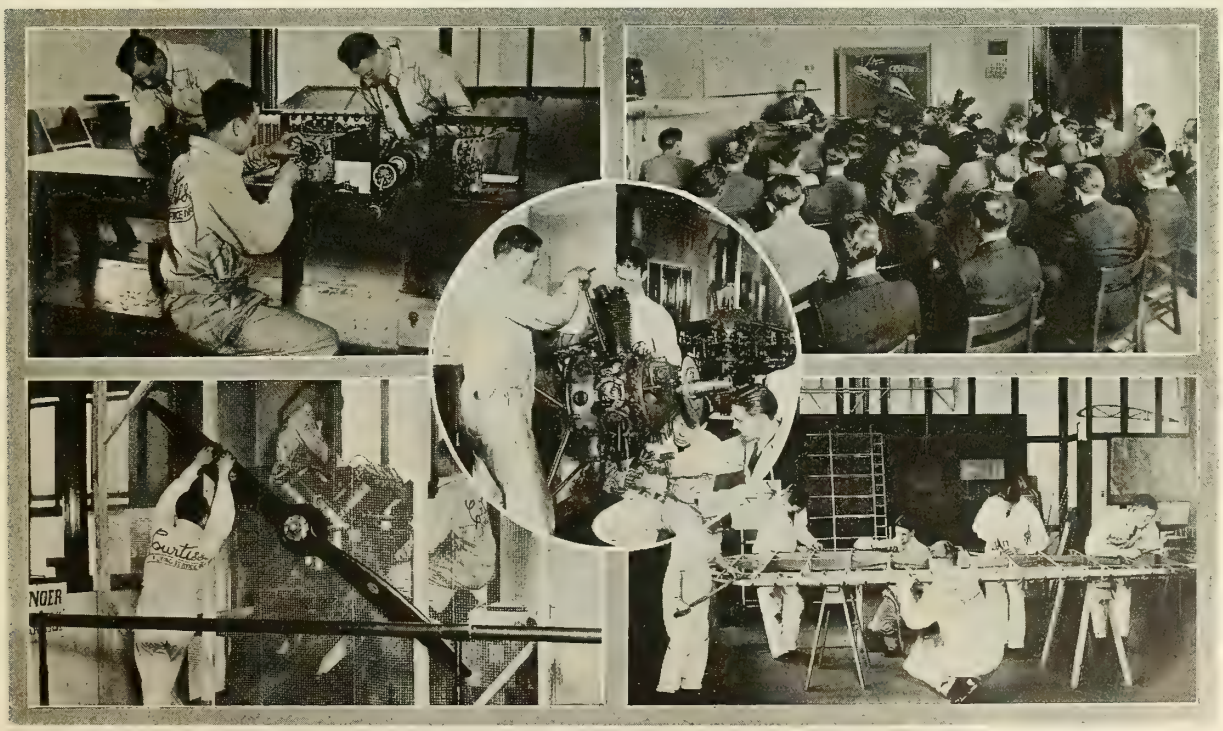
The Seaplane Pilot's Course. Practically every yacht club, we believe, will soon have its air division composed of members who prefer to cruise above, instead of on, the waves. Already certain of these air-minded yacht club members have learned to fly and now anchor their seaplanes and amphibions beside their yachts. This course appeals to bankers, lawyers, and executives who can see the wisdom of having a "ship" that can be a means of very fast transportation in business, as well as an ideal diversion in recreation. This course is also for those who desire a maritime flavor to their flying. Dual instruction for ten hours is devoted to learning taxying, take-offs, turns, landings and the efficient handling of seaplanes on the water and in the air. In the Seaplane Pilot's Course, ten hours of solo flying follows ten hours of dual instruction. Frequent check flights intersperse the solo practice to smooth out the details of flying technique. When the student finishes his solo time, he is thoroughly checked by his instructor in every phase of seaplane flying and is then ready to take the examination given by a Department of Commerce inspector.

Summer Flying Camps

During the approaching summer, a large number of college students will learn to fly and they will want to take their training where they can be near fashionable summer resorts and enjoy the recreation of camp life.

Two such Aviation Camping Grounds will be opened this summer in localities which society folk have judged as the most desirable vacation spots in the country. One is to be at Martha's Vineyard, Massachusetts, and another at Portland, Maine. These sites are ideal for flying, and the climate is so consistently good that there is very little flying time lost by unfavorable weather.

Flying courses given at the summer camps cover a wealth of detail in constructional and theoretical phases of aviation, and the flight training is given under the same methods as at all Government approved schools. Because of the limited time, however, the (*Continued on page* 180)



Representative scenes at the ground schools of Curtiss-Wright, showing students at work in classrooms and shops

THE FLEET'S IN — ALL IN

By

by Caldwell

WELL, folks, I was enjoying myself in bed the other morning, reading the Daily *Mirror*, That's my favorite morning paper, though in the evening I turn to the *Graphic* for health hints and the latest that can be done with legs, pictorially, under the direction of Bernarr MacFadden. But in the morning I refresh myself with the *Mirror*—and if you see your reflection in that sheet, boy, you've done something, most likely an infringement of the matrimonial, or murder code.

Well, I was running over the headlines such as, "BATHING-SUITLESS BATHING SEASON OPENS AT KEYPORT," and "FOLDING BED SMOTHERS TWO IN GIN LOVE NEST," and a few more standard items like that which are calculated to start the day off right for a New Yorker. Then I came on the big news of the day. "THE FLEET'S IN!" Now there was something for the girls about town. And what a sensation that must have been in Childs' Fifth Avenue. Happy days are here again, Gladys!

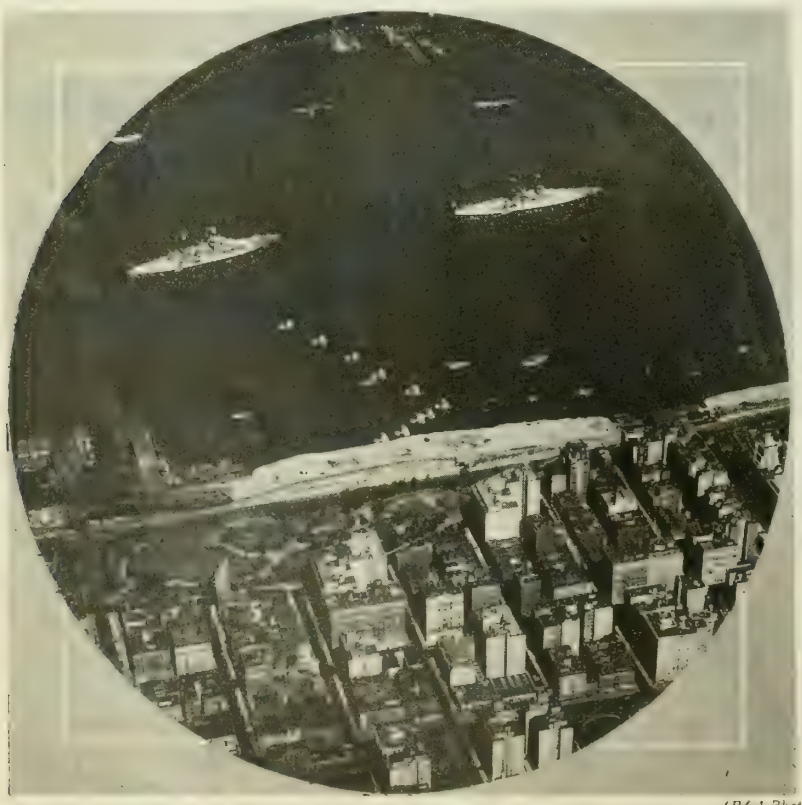
You know, it's three years since the fleet visited New York. I can hardly realize that three years have gone by since I stood on the roof of a downtown skyscraper and watched the battle fleet appear silently out of the mists of the harbor, like gaunt grey ghosts of a vanishing era of ocean warfare. As such they appeared to me then, as I reported faithfully in AERO DIGEST for the six readers I had at that time. That six got disgusted with me, and quit, so what I wrote then is new for the six of you I have now, so I'll repeat it here, from the June, 1927, issue of the DIGEST.

"What a wonderfully impressive sight they made, those old battleships! On they came, in stately and formidable array, grim old killers of the sea. The enshrouding curtain of mist was lifted from the waters by the warm rays of the morning sun, drawn back to the far shore of the harbor, disclosing ship after ship, steaming slowly and majestically up the river. As I looked at them plowing the still waters, saw the squat sturdy bulk of them moving toward me, I could understand how some old admiral who had spent his young manhood, his old age, loafing on their roomy decks and in their comfortable cabins, should have grown to feel that they were invincible. The very size and weight of the ships, the vast bulk of them, cater to that belief; for without a shadow of doubt a first-line battleship is the most powerful *looking* weapon ever created by man. There is nothing that can touch it for sheer might and majesty. Even a land fort, perhaps with more hitting power, is not nearly so impressive; it is just so much concrete and guns.

"But a battleship! Man, if you've seen one of them you wouldn't wonder that men believe in them—believe that they are impregnable to attack from an insignificant looking thing like a bombing plane. The way a battleship seems to squat sullenly on the water, the way it forges ahead with a sort of implacable surliness, the way its long rifles stick out belligerently fore and aft,, all add an illusion of might, of power, to what is, after all, only some hunks of steel tacked together with rivets—rivets that an underwater bomb-explosion will tear loose, allowing the sad sea waves to seep within to annoy the gentlemen in their comfortable cabins, and finally to eject them unceremoniously.

"There is indeed a sad thought, mates. As I watched those old sea fighters forge slowly past, my mind went back to the days when they had ruled the seas, undisturbed in their mighty possession, except only by the hard-hitting blows of some other old warrior like themselves. And it was hard to realize that these magnificent ships were only grim grey ghosts from a rapidly vanishing past; that in a few more years—perhaps twenty, which is a short time in the history of warfare—these beautiful creations of man would go to join the Roman Galleys, the frigates of Nelson, the *Monitor* and the *Merrimac* of the Civil War, and live thereafter only in history.

"As I stood there on the roof of that skyscraper in lower Manhattan, a great feeling of sadness swept over me. To others, perhaps, that line of battleships represented power that would go on without end; to me it was merely the passing parade of dying majesty. I could see, I thought, far-



(P&A Photo)

Battleships lying at anchor in the Hudson River, with an aircraft squadron overhead

ther ahead than could those fine old men who trod the decks of those splendid ships in all the pomp and circumstance of naval dignity and tradition. I could understand why they admired and loved their ships—for I could admire and love them too. And as the flagship steamed past, I found myself wishing that none of this would change; that these good ships, with these good men aboard, would continue to police the seas, and not give place to little buzzing hornets dealing death from 20,000 feet above.

"But I knew that such a wish would not be granted. I knew, as certainly as I know that I am sitting here now, that all of this must pass, that all of these great ships must go at last to the ship-breaker or to the bottom—*and that some time in the not so distant future, no such ships would be built to take their place.*

"Progress and invention move forward even more implacably than do these old ships; and now that progress has taken to the air, it moves on wings."

WELL, after three years, it is time to check up a prophet. Prophets, you know, have a habit of prophesying things under the hope that what they prophesy, if it turns out wrong, will be forgotten anyhow. But I've written so much on the battleship-airplane question during the past five years, and so caustically, that when I see an admiral (other than Admiral Moffett) I instinctively dodge to cover. They refuse to forget what I say, and continue to dislike me.

I said that "some time in the not so distant future no such ships—battleships—would be built to take their places." Even I, pessimistic as I then was about the future of the battleship, didn't realize how soon my words would be *proved* to be true. When I said them, a full three years ago, they merely formed a personal opinion of my own; today they form the policy of the London Naval Armament Treaty. At that Naval Conference it was agreed that obsolete battleships should be retired, and that *no new ones should be built to take their places.*

The sea warfare talk today centers on fast cruisers, on airplane carriers, on destroyer leaders, on submarines, on aircraft. The battleship is forgotten. Forgotten, that is, except as a convenient measuring-stick, for fleet tonnage among nations and as a topic of conversation at banquets by obsolescent admirals. Rear Admiral Louis R. de Steiguer, for instance, after partaking of a heavy meal at the Hotel Astor recently, heaved himself onto his feet and deposed as follows: "The battleship is the backbone of the fleet, and, contrary to the opinion of many in our country, we are not ready to give it up. It has taken us 150 years to build that fleet, which is the work of our best minds and best hands."

Such is the reasoning power of an admiral! It took 150 years to build, therefore we shouldn't give it up for something better! It took many years and many millions to build the Erie Canal—but the railroads put it out of business! We shouldn't have given up the canal. It took many years to build the old Grand Central Station in New York, complete with smoking locomotives and dirt. The railroads were apparently erring when they threw it all away for electrified trains and a marble palace. At least, such would be the logical conclusion from Rear Admiral de Steiguer's reasoning.

That London conference, by the way, turned out to be a Naval Building Conference. Our lads went over, ostensibly, to see what they could sink; actually, they came back to see what they could sink the taxpayers for. I wouldn't object if they'd sink us for a few more aircraft carriers, which we need and which I'll refer to later; but I object strenuously to sinking us for more cruisers. They do that because they're congenitally unable to think for themselves. They see John Bull building cruisers, so they have to do the same. I wish some American naval man could think for himself instead of blindly aping the English. We copied their uniforms, their gold braid, and their titles. Need we necessarily copy their entire naval policy?

HOWEVER, of that, more anon. Let's get back to the moment I spoke of when I was reading the *Mirror*. When I read, "THE FLEET'S IN!" I was galvanized into life, or into what passes as life in one of my advanced age. I leaped from bed, all joints creaking. It was eleven o'clock, my usual hour for rolling out, so the daily dozen exercises were departed from the radio. That's why a lot of old men aren't wearing as well as I am, incidentally. They get up in time to get those radio exercises and wear themselves out. By the time I get up, everybody's done exercising and is indulging in mild flirtations with his secretary—I'm speaking now of big business executives like myself.

By the time I got myself feeling slightly less like the last

(*Continued on page* 212)



(P&A Photo)

Navy planes flying in formation over the financial district of New York City

COMMUNICATION PROBLEMS IN SCHEDULED AIR TRANSPORTATION

By

Herbert Hooner Jr

Radio Technician, Western Air Express

IT was pointed out in last month's article that in air transportation there are many problems of communication presenting themselves which are not strictly of a radio nature. Weather reports must be collected and correlated, and periodical forecasts must be made up. This information should then be distributed to the pilots and field personnel within the territory which is effected. The dispatching of planes as they proceed along the airway should be carefully checked, and operation reports of various kinds are constantly being exchanged between many points on the route.

The traffic departments have a large volume of correspondence regarding reservations and other matters which demand economical and rapid transmission. Communication facilities must also be made available for the convenience of passengers at airports.

The handling of these communications presents a difficult problem because a high degree of reliability, flexibility and quick service is necessary, and at the same time the cost must be held within reasonable limits. A brief outline of the facilities which are available to do this work may be of interest to readers of this series of articles.

The communication system of a transport company is divided into many units—some supplied by the Government, some by public utilities for a consideration, and some owned and operated by the transport company itself.

From the Government we receive the weather reporting system over the civil airways, the broadcasting of information regarding weather and terminal conditions, and the radio beacon.

From the utilities we have the telephone, both local and long distance, the telegraph and the printer.

Owned and operated by the air transport companies, we have the aircraft radio and the point-to-point emergency radio circuits of those transport companies operating over airways other than civil airways.

The communication problems of air transportation may be divided into two distinct classes:

First, the provision of telegraph and telephone facilities at (a) airports for the use of the passengers, and (b) for handling the communications required along the ground for the operating, traffic and administrative departments. Second, the provision of facilities for communication by radio between planes and the ground.

These two classes of problems should not be confused and for that reason are outlined separately. At the same time it should be clearly understood that all communication problems of the air transport companies are intimately related to each other, and must be considered as a whole.

Ground systems of communication can be divided into three groups—namely, facilities for passengers, facilities to traffic and administrative offices, and the communications system of the operating department. They will be presented in this order.

Passengers will expect the same telephone and telegraph facilities at the major airports that are now provided at railroad stations, and since the success of air transportation of passengers depends, in a large measure, on the saving of time, the most rapid communication facilities which it is practicable to secure should be provided. Direct special wire connections can, in some cases, be made with the local telephone and telegraph offices, or in cases where the volume of traffic warrants it, employees of the communicatiton companies can be given permanent space in the airport passenger stations. Messenger boys can also be provided to deliver messages and run errands.

There are several distinct types of airports, each with its particular problems and needs. These may roughly be classified into two groups: those which are situated on established transport routes, which may be either terminal, junction, intermediate or emergency ports; and those which are off the established air routes. In all cases the final determination of whether or not direct communication service shall be provided at an airport, depends upon how



A Western Air Express Fokker F-32 equipped for plane-to-ground radio communication

much traffic the communication companies can reasonably expect. At the larger airports, where the revenue warrants, direct telegraph lines can be arranged for, and at the smaller ones messages can be teelephoned in over the regular telephone, if the proper arrangements are first made. In many instances, employees of the airport can act on behalf of the telegraph company, to receive the message and transmit it into the local office.

The traffic and administrative offices of the air transport companies necessarily must have telephone service. Telegrams may be sent to, and received from, the telegraph office over the regular telephone. In any cases a messenger call box will be found to be convenient. Where the volume of traffic justifies it, a direct telephone wire or printer to the telegraph office may be arranged for.

In cases where the offices of the air transport company are separated, such as a downtown traffic office and the office at the airport, one or more privately leased telephone wires may effect a large saving in telephone bills, and also a considerable saving of time.

The communications systems of the operating departments undoubtedly present more problems than either of the two groups mentioned above. The types of service that are available for this work can be listed as follows:

Telegraph service by filing messages in the ordinary manner.

Telegraph service by means of special hook-ups and arrangements with the telegraph companies for the requisite speedy service.

Long-distance telephone calls.

Special telephone circuits similar to those employed by railroads in their train dispatching work.

Leased printer circuits.

Leased telegraph lines.

Radio, either government or privately owned and operated.

The relative merits of each of these methods, or any combination of them, depends upon the individual requirements of each air transport company, in regard to volume of traffic, speed of service, length of route and many other factors.

The traffic departments of the air transport companies should maintain a close contact with the operating departments in selecting a communications channel which will satisfy the needs of both. In many cases a large saving can be effected by joint use, on the part of traffic and operating departments, inasmuch as the traffic department is most interested in intermediate points and terminals along the airway that the company is operating. Although the proper solution of these communication problems is of paramount importance to the transport companies themselves, the general public finds little that is of interest in this phase of the subject. It is the radio contact between airplanes and the ground that makes the greatest appeal to the traveling public, because the average person most easily grasps the significance of its value.

The wider use of radio communication between airplanes and the ground will provide more reliable operation, greater safety and increased effective overall speed. If the public is fully informed of the facts relating to the use of radio, whenever opportunity to do so presents itself to the traffic and publicity organizations, it will greatly increase public confidence and thereby result in a reduction in sales resistance.

The idea that facilities will be provided whereby the traveling public will be able to use the radio apparatus for making personal telephone calls to and from the plane is a misconception that has unfortunately grown up during the experimental stages. It should be strongly stressed that such conversations cannot be permitted on air transport lines generally without seriously jeopardizing the use of apparatus for its primary purpose.

The use of radio in aviation can, for convenience of discussion, be divided into the following three types of service: The first is the service provided by the Government, through the Department of Commerce, along certain of the established airways, for broadcasting by radio telephone half-hourly weather reports and information regarding landing field conditions. Radio beacons, providing



At ground stations, such as the W.A.E. Los Angeles terminal pictured here, two-way radio communication is maintained with ships in flight, providing greater safety and increased effective speed.

radio range signals, by which the pilot can be guided to his destination even when the round is not visible, have also been installed on several routes, and additional installations are in prospect. These radio telephone and beacon stations use frequencies between 285 and 350 kilocycles, corresponding to wave-lengths between about 850 and 1,050 meters, or slightly above the wave-lengths in use by the ordinary broadcasting stations.

Efficient receivers have been developed by several manufacturers to cover this frequency range. Their use permits private fliers and transport ships to receive weather information and navigational aids over large areas of the country. Naturally these stations will not be able to carry on two-way communication with the many radio-equipped planes that will soon be flying near them, and still maintain their broadcasting service.

The transport lines, with their responsibilities for the safety of life and property, are authorized to establish their own chain of ground radio stations for communication with planes along the routes which they fly. Frequencies have been designated by the Federal Radio Commission for assignment to this purpose, after consulation with the communication representatives of the air transport operators and with others concerned.

To allow private planes to talk to the ground and receive special landing instructions, the Federal Radio Commission has decided to license any airport to use a low power transmitter, with a range of from ten to twenty miles, on a wave-length of approximately 1,060 meters. The itinerate flier, therefore, needs to have only a long-wave receiver to receive this government information, as well as instructions from the landing field. His plane will be permitted to send on a wave-length of 3,106 kilocycles or about 98 meters, thereby making it possible for him to establish two-way contact when within range of an airport.

AIR—HOT AND OTHERWISE

The Show—That's All

By Frank A. Tichenor

THE New York Aircraft Salon, like the Whiskey Rebellion (an American civil war of which most Americans never heard, although it might have been a more notorious one had it been better advertised and managed), has passed into history, leaving few ripples behind. But one relic of the "Salon" will serve as an occasional reminder to some interested parties for quite a time. The deficit is between $15,000 and $20,000. This sum comes out of the Aeronautical Expositions Corporation's treasury, a company whose stock is controlled by the Aeronautical Chamber of Commerce.

At the same time the industry is out at least a half million dollars for the cost of putting on the show. Indirectly, of course, the loss is greater. Attendance totaled 47,932 adults, who paid $35,949 at the box office, and 6,932 youngsters at half price who paid $2,415.70. The industry was mulcted $4,786.50 for exhibitors' tickets. Thus the total receipts were $4,151.20—not quite as much as the 44,670.11 it cost the industry to buy space for exhibits.

This affair not only ended wrong, it began that way. There was no reason for a show at the time of year selected, and Madison Square Garden could not be secured for a date earlier, when there might have been admirable prospects, because it had been booked for indoor ice polo, prize fights and the circus.

We followed the circus in, and when we entered we discovered that the movers had not taken the circus smells out with the other properties of Ringling Brothers-Barnum and Bailey. For several days after the Aircraft Salon opened, sniffing ticket holders who strolled about the so-called *main* exhibition floor, *in the basement,* wondered if "salon" really was the most descriptive word. It was evident that a flower show had not preceded us. Aviation is essentially a fresh air matter. The atmosphere was wrong for this ill-timed exhibition of its wonders.

But, as I have already intimated, it was not wholly smells that smothered the show. Having been misconceived, it was misborn; having been misborn, it was inevitably doomed to deep misfortune, in spite of the desperately working Hendersons.

We of AERO DIGEST knew (and declared) that if the Aeronautical Chamber of Commerce and the American Legion held their shows separately something mephitic would occur, though we had never dreamed of anything as malodorous as that Garden atmosphere. We made every possible effort to merge the exhibitions, but because of previous commitments on both sides, this was impossible. The Chamber had to have its show, and it certainly has HAD it.

As aircraft shows go, it was equal to anything which reasonably might have been expected. Planes were there, engines were there, and accessories were there, all displayed with gratifying artistry. In these and other matters which were in the scope of their concern, the Hendersons—Cliff and Phil—delivered excellent showmanship in full.

What must be set down as the failure of the show lies at the door of the Aeronautical Chamber of Commerce.

According to our conception, the purpose of a chamber of commerce in any industry is to function as an aid to the manufacturers associated with in spreading business, in increasing efficiency and, above all, through coöperation, in saving money by getting the biggest returns for every dollar spent.

Holding a show such as that which recently haunted Madison Square Garden did not prove that the Chamber which our industry has brought forth is functioning with these necessary purposes in mind. To the contrary, it looks as though the Chamber's management was anxious to have its members spend as much as possible to insure an income sufficient to expand the Chamber's operations, regardless of the harmful effects on the pocketbooks or welfare of member companies.

A remedy for such extravagance is included, I believe, in the formula set forth by Cliff Henderson and discussed in these columns last month. His belief is that no shows should be decided on except by a consenting vote of the majority of exhibiting members of the Chamber, the ballot consisting of a questionnaire including these queries: Does the industry want a show? When and where should it be held?

I have personally questioned a majority of the exhibitors at the recent show, asking their opinions of this Henderson formula. Agreement with it is unanimous, as is the statement that, if such a questionnaire had been sent out this year and the opinions evinced accepted as a guide, there would have been no show either at New York or at St. Louis.

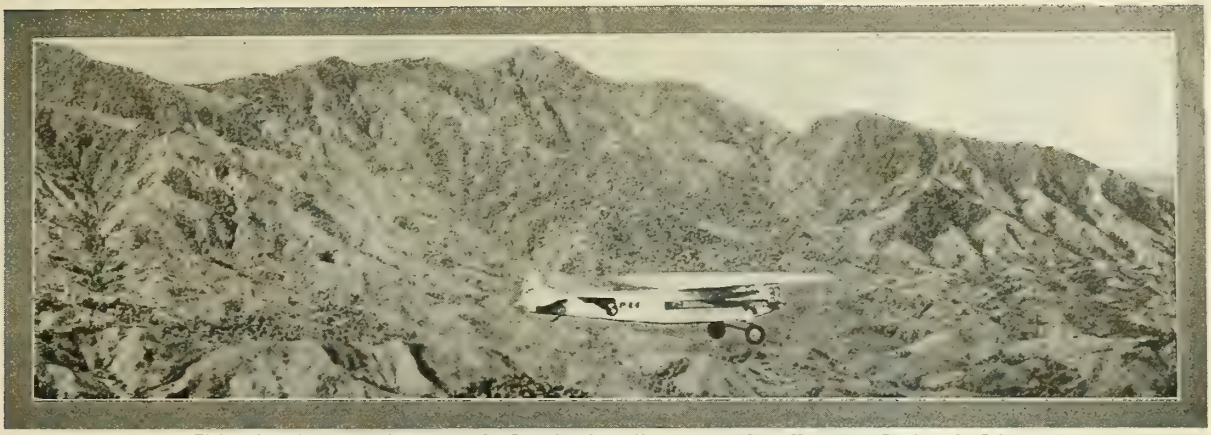
Speaking of the St. Louis show reminds me that the general manager of the Aeronautical Chamber of Commerce, Luther Bell, recently told me that the Aeronautical Expositions Corporation made $18,000 out of that show.

To have taken $18,000 from the underwriters of the St. Louis show is to have taken blood money. For the underwriters the show was a financial failure of the most melancholy sort. By a unanimous vote of the Aeronautical Expositions Corporation's stockholders, it ought to be returned to them. It never should be frozen into history that the Chamber profited, directly or indirectly, at the expense of the St. Louis sportsmen who underwrote that show.

It's high time that a majority of the 900 members of the Chamber of Commerce take an active interest in its management. It's your money that's being spent—some $170,000 of it last year. We can't afford this drain! It's plain foolishness and it's bad business. And it ought not to be allowed to go on indefinitely.

Not content with extracting the last dollar from some of those who exhibited, the New York Aircraft Salon sponsored an "Official Directory."

I have before me as I write, the "net advertising rates" of that "Official Directory, sponsored by the Aeronautical Chamber of Commerce of America, Inc." The rates, circulation, etc." are set forth fully and are interesting. The letter is typed upon elaborately headed Aircraft Salon paper and signed "New York Aircraft Salon, Show Division. The rate card for advertising in this program promises a circulation of 200,000. A quotation from the accompanying letter, dated April 15, 1930, follows: "The Directory will have a minimum paid circulation of 40,000, selling at the Salon at twenty-five cents. Its ultimate readers will certainly number 150,000. In addition there will be a post-show distribution of 5,000 copies to individuals and companies comprising (*Continued on page* 180)



Flying through a mountain pass on the Pan American Airways route from Havana to Santiago de Cuba

THE WEST INDIES AERIAL EXPRESS

William C. Hammond

CAMPO COLUMBIA, the Havana terminal of the first leg between Miami, Florida, and Santiago de Cuba, is one of those expansive pieces of meadowland which serve as natural airports throughout the world. Here the Havana Limited, the West Indies Aerial Express, and the Canal Zone air mail and passenger liners drop off the United States mail, and refuel for the next hop. Some go east and some go west, and despite what Mr. Kipling says, they all meet again within a few days at the repair depot in Miami for minute inspection and repair or overhauling, as the case might be.

Campo Columbia has just enough ridges and depressions in it to put a good pilot on his mettle, presenting the opportunity for picking the good spots on which to "set her down" neatly on three points, and giving the novice passenger reason to say, "Why, I didn't even know when we touched the ground." Since the slightest departure from a perfect landing often causes apprehension among those unaccustomed to the air, great emphasis is laid upon bringing the ships down gradually, and landing the old bus softly and gently, in order to make 'em Air-Minded instead of Scare-Minded. Between the ridges and a sky full of Cuban Cadets in DH's, PT's and Voughts, it is at times something of a large order.

A siren shrieks when the 11:30 ship from Miami is sighted, and the mechanics are busy starting the three Wasps on the ship eastbound for Camaguay and Santiago. The pilot goes outside to observe the weather. The co-pilot gets the maps and the flight report board, and the crew of four stand by ready for the first bell. The incoming ship unloads, and the passengers just have time to catch a sandwich.

"Guess we'll take the north shore today," remarks the pilot, "Looks kinder tough down the middle."

The gong sounds and we go aboard, followed by the passengers at the second bell. The pilot clears out the engines one at a time, and steps them up a bit to keep them from loading up again. We get the signal from the field manager, and taxi out to the far corner of the field where we wait the flag signal for starting time. There she goes; and the pilot slowly advances the three throttles. When the ship gets over the hump, he revvs them up to 1,650 or 1,700 and takes off. At a thousand feet he eases them back to 1,600 r.p.m., synchronizes them, and takes a sweeping look at the weather. Squall ahead—looks to be about Gardenas. He studies the water below . . . wind about twenty miles from the north which checks with the weather report . . . drift angle about ten degrees.

The co-pilot is checking off the towns as they pass on the right, Centrale Hershey, birthplace of the chocolate bar; Matanzas, on the bay of the same name; and on that long stringlike peninsula just ahead is Varadero. In a moment we sight Cardenas, with its sugar boats loading at the docks.

Into the squall . . . all vision, except straight down, is cut off, and the pilot is flying entirely by his instruments. The altimeter shows five hundred feet; climb indicator at zero; air speed at 110 miles per hour. The mercury ball in the turn and bank indicator hops gingerly out to the right as the turn indicator swings over to the left . . . a touch on the right rudder, and it scuttles back to the center like a school boy caught in the act of slipping out the back door while teacher isn't looking.

The Bahia de Cadiz coastal light and Corralillo slip past in the squall, and as we emerge from the wetting, Rancho Veloz appears, with its railroad coming down to the water's edge. Concha, on the double peninsula, passes under our left wing, and we're back up to 2,000 feet where the oil temperature is holding at 68 . . . 69 . . . 67.

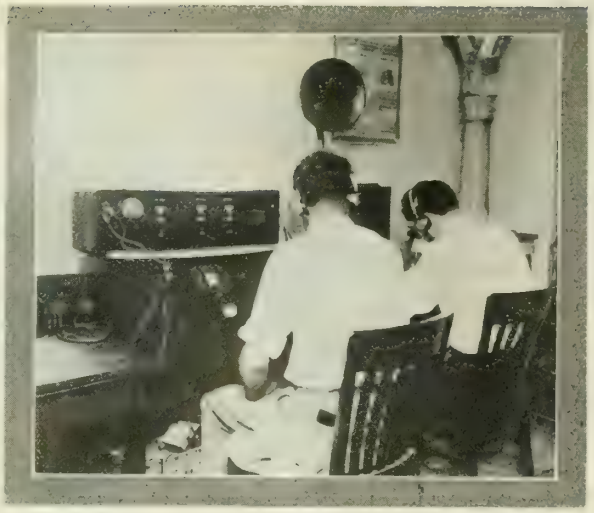
The sugar mill, Centrale Nazabal, tells us that Caibarien and Remedios are just ahead, and that shortly the big pale green lake near Punta Alegre and Moron will come into sight. Here, a large flock of pink flamingoes give daily lessons in formation flying. In time of war it would be an education for young pilots wishing to learn that gentle art. Since formation flying has no part in commercial aviation, a former war pilot on the line who gazed at the sight in fond recollection came near losing his job for admiring these birdly maneuvers.

The radio operator hands the pilot a weather report from Camaguey. It appears that in all directions, except north, east, south and west, the weather is fine around Camaguey. In these directions the rain seems to be trying to make up for a long dry spell, and it begins to look uninviting to say the least. We cut inland past Moron to avoid the mountains around Centrale Jaronu, and pick an opening, a grayish area between two black babies. Anyway, Camaguey reports better conditions to the south, and the gray stuff looks passable in that direction, so we'll have a go at it. It's going to be rough, so we tighten up our safety belts.

In we go, at 500 feet. She balloons up fifty feet or so, and the bottom drops out from underneath us for a loss of altitude around a hundred feet. The pilot's busy trying to

keep the instruments from jumping out the window. The needles are hopping around like Mexican jumping beans. An up-current socks us on the right wing tip and I all but spill out of the seat . . . saved by the belt in the 10th . . . oh, what a round!

"For no good reason at all," Camaguey pops up right under us, and we swing left along the railroad tracks at a hundred feet altitude. The field manager is right about his weather . . . there isn't a hole in it big enough to drop a BB shot without splashing, so, in a cloud of good old red mud and spray, we slide in to a landing in the downpour, which in my humble opinion is as funny as an old woman selling chewing gum. Motor covers are put on, as soon as the engines are run dry. Passengers scuttle into the office under umbrellas to get their tickets punched and to stretch their legs for the first time in three and a half hours.



Ground radio station communicating with a plane in flight

The hop to Santiago is a short one, about an hour and a half; so the mechanics put in 100 gallons of fuel, which, with what we have, is sufficient to make double the mileage required. With a piece of tarpaulin, they carefully shield the chamois covered funnel from the rain during the fueling. By the time they have done this work, and warmed up the engines, our allotted half hour is up. The rain has about passed over, and Santiago reports "Calm air, visibility ten miles, ceiling unlimited."

Camaguey is noted for its fishtailing winds; so we catch it on the nose and give her the guns before it changes its mind and turns around. Our true courses, without allowance for wind drift, so far, have been 92 degrees, 110 degrees, 123 degrees; and had we gone the route past Jaronu, we should have turned sharply to the right and flown 176 degrees into Camaguey. The course into Santiago is 125 degrees.

Checking on the two sugar mills, Centrale Siboney and Centrale Najasa, we figure a drift angle of five degrees, and fly 120 degrees. This checks correctly on Guaymaro, Ojo de Agua ridge, and Centrale Jojabo. After a short space we hit a rectangular patch of green forest which further assures us that our calculation has been correct. We're at 4,000 feet now, where the air is as smooth as velvet. Usually it's rough down below when flying over inland Cuba. The large square patch with the clump of trees in the center passes on our port side, and Victoria de la Tunis lies off to the left about five miles.

We're over a huge forest now, with no particular land marks for perhaps twenty minutes. Later we should hit the intersection of the Rio Cauto and Rio Cautillo north of Bayamo. Passing this point, we see the isolated ridge ahead with Jiguani at its base. These are closely followed by Centrale America and Centrale Palma. On a previous trip with a new radio operator aboard, he asked for a position when we were directly over the former named sugar mill. I told him that we were over Centrale America, and had to show it to him on the map before he'd believe it.

The mountain sides are densely covered with palm trees, bananas, ferns and all kinds and types of tropical foliage. The soil is rich, and thousands of acres of sugar cane abound in well watered plains adjacent. Tropical fruits of all kinds are plentiful in this section, and are, for the most part, decidedly pleasant to eat, and totally different from any grown in America.

We pass over the mountains at 2,000 feet, ease down to 1,700, and skim the foothills as we go in for the landing. There lies Santiago, hugging the harbor and looking for the world as though it would really like to stick one toe at least in the water, only it happens to be the middle of winter, and the thermometer is way down to eighty degrees.

There's the old windmill, which gives us the wind direction, not that it really makes any difference, for the field is a single runway and the (*Continued on page* 202)



Group of Fokker trimotors of Pan American Airways lined up on the apron at Campo Columbia, Havana

AERO DIGEST

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HOW AMERICA LOST OUT

IN 1922, some time before Juan de la Cierva startled the world with his windmill airplane, the famous Dr. Max M. Munk (who, by the way, has just accepted our technical editorship), conducted tests with autogiro models in a N.A.C.A. wind tunnel which he designed and built, after he had been invited by our government to visit the United States. These tests, successful and significant, were recorded in a descriptive and explanatory paper by Dr. Munk, the importance of which was unfortunately not realized. That astonishingly vital document was simply shelved at Washington.

When four years later Juan de la Cierva introduced his machine, the N.A.C.A., startled by the tragedy of its non-appreciation, issued the paper which long before had described the way to achieve the very results obtained by the Spaniard, as document Number 221 in its list, under the title of "Economy and Effectiveness of Helicopter Propeller; by Max M. Munk."

Although it lay hidden all those years in an official cubby-hole or file, this basic dissertation remains even today the most authoritative source of information about model tests concerning the principle of the autogiro. No other document includes knowledge more complete or foresight more prophetic.

The sad aspect of this official lack of comprehension is that failure to publish the paper meant lack of stimulation of American thought along the lines it so plainly pointed out. Had it been published promptly, as it should have been, the patents and the royalties now in the possession of the brilliant young Spaniard might now be in the possession of some brilliant young American. These facts are worthy of profound official consideration.

GLIDERS

ALL the world has read in the newspapers that Col. Lindbergh has been studying gliders with profound attention, expects a popular enthusiasm for this sport, and has urged Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, to do what he can to encourage American development of motorless aircraft.

Col. Lindbergh has been consulted concerning regulations for the construction, use and licensing of gliders, and for the licensing of glider pilots. He has made valuable suggestions, some tending to minimize the dangerous features of the new sport and science which he hopes may become popular among Americans of all ages and particularly among boys and young men.

Gliders are obviously aircraft, yet as obviously should not be subject to such drastic regulations as must be applied to motored ships. Lindbergh believes that gliding may be put upon a valuable constructive basis if controlled by special easy-to-meet regulations.

Many other minds are thinking about gliders in America. A letter received by AERO DIGEST from Captain Frank Hawks, famous pilot and aviation superintendent for a great oil company, expresses the belief that various points are vital to American progress in the arts of gliding and soaring. He declared, even in advance of Lindbergh, that the Department of Commerce should issue rules governing launching, towing, licensing, etc.

We agree with him in the belief that every pilot in the country should give thought to gliding. Having recently made a notable glider flight himself, Hawks believes a nation-wide survey should be undertaken to determine the most favorable locations for soaring flights. He is convinced that the glider will suggest to Americans a "next step" just short of professional aviation as we generally understand it; that is, the development of interest in the small, light-powered plane. Such interest is far more general in Europe that it has been here. If the glider can help us bring about a general reversal of that situation, it will have rendered signal service. Captain Hawks also points out that we must make gliding a sport convenient for many; that we must. for instance, study mechanical launching methods which will safely eliminate the large crew of assistants now generally necessary to the launching of a glider, thereby making possible a wider utilization of the automobile and motor boat as starting power for flights from flat terrain.

Certainly it is reasonable to assume that, with two such men as Col. Lindbergh and Frank Hawks thinking earnestly about gliding, an increased general American interest is soon to be expected.

SOUTH ATLANTIC CROSSINGS

THE ninth successful flight across the South Atlantic, that of Jean Mermoz with two of his French coun- again indicates that before long weather conditions and perhaps some other influences will make Europe nearer to South America than North America is at present. Only one non-step westward flight of heavier-than-air craft over the North Atlantic has succeeded and that not fully. Which makes it reasonable to conclude that no regular northern cross-Atlantic service can be said to be in sight at this time.

On the other hand, the Mermoz plane, carrying mail across the South Atlantic, may have been the pioneer of an almost immediate frequent schedule mail service from Europe to our southern neighbors.

This flight has two significances—one, its new proof of the effectiveness of heavier-than-air flight (satisfying to the American airman), and the other, its indication that Europe will soon have incredibly quick mail and light freight communication with the southern half of the Western Hemisphere, while ours is far inferior (disturbing to the American business man, who has been neglecting Pan-American opportunities so steadfastly, but now perhaps is waking up). France has been more enterprising than the usually enterprising Germany in this effort; both have been more enterprising than America.

Two United States air transport companies have been carrying mail to South America, but they have also been playing politics in Washington while Germany and France have been doing something more than practical missionary work. If we allow the French and Germans to go much farther in this matter without competition, we may find ourselves confronted by a South American task much more difficult than it would be if we were now wise enough to show anything like the initiative which we often boast we possess. The American companies either should merge at once or settle on a policy of harmonious cooperation for the

benefit of American manufacturers and merchants who are likely to be most seriously affected by further European business expansion in Latin-America.

Here is a situation in which the quick and efficient development of American air mail would play a role of supreme importance. Nothing should be permitted to interfere with it. To the nation which first develops such an efficient service will go a large proportion of the rich trade of the countries reached by that mail development.

AIR-MINDED BOY SCOUTS

AT a recent meeting of the National Council of the Boy Scouts of America it was decided that a division for Air Scouting should be formed among the older members, modelled in general after the pattern of the parent organization's Sea Scout branch.

This move is a more hopeful sign than some of the older men associated with the industry so far completely understand. The air-minded boy of today must be the air-minded man of the days to come.

This is something which the industry should studiously consider. Its future will be measurably among the lads who now are forming aviation units in the Boy Scout organization and other well-supervised groups.

Whatever it is possible for those interested in the industry to do in the encouragement and assistance of the Boy Scouts in this development of air-mindedness should be done without hesitation. Every adult aeronautical organization should definitely endeavor to devise means of giving a helping hand to the youngsters. From them at least in some measure will come their future membership.

THE WAR DEPARTMENT'S ATTITUDE TOWARD THE WRIGHT BROTHERS

TO add to the long-standing evidence that the Wright brothers were woefully wronged by the Smithsonian Institution, there now appears the new and startling charge that the War Department, now so abjectly in their debt, also looked on them as cranks.

Thus history repeats itself. Every schoolboy, reading that Columbus was thrown into prison, has swelled with the indignant conviction that in the United States a man accomplishing a like achievement would quickly be honored to abounding superfluity.

Yet, John R. McMahon, a scientific writer who has spent fifteen years of research in the preparation of an authoritative biography of the Wright brothers, finds that apparently the only thing America omitted in its attitude toward these two of her greatest sons was imprisonment.

Even when a year had followed their historical flight at Kitty Hawk, and when English and French governmental agents were knocking at their door in Dayton, the patriotic brothers after several rebuffs gave the United States Government an opportunity to obtain for nothing but some cheap coöperation a virtual monopoly of their whole heavier-than-air idea. But, says Mr. McMahon, the War Department again treated them as "indigent cranks seeking a handout."

After delving deeply into the dispute between the Wrights and the Smithsonian, the writer concludes that "officials of the Institution were guilty of conduct that can only be described as deceptive and dishonorable." And as for the newspapers throughout the country, he says (and proves) "they scoffed," the editor of a bee journal being the first during the early years to appreciate the significance of the Wright brothers' experiments. This bee journalist actually hazarded the guess that the Wright machine some day might fly over the North Pole.

POSTMASTER GENERAL BROWN AND THE PROPOSED AIR ROUTES

POSTMASTER General Brown would perhaps find it wise to go a little slower than he apparently intends in preparing for the opening of a nation-wide network of air routes for passenger and air mail planes. At a recent meeting of air executives which he called in Washington, he not only discussed the matter of air mail poundage, but asked the air transport officials to prepare a map showing the various routes they would recommend for his general passenger and mail transport line expansion. There may be danger in too great a multiplication of air mail airlines at the present moment. Such measures might easily so divide the business that no profit would be possible for anyone.

The Postmaster General could render a very useful service by first analyzing and working upon the Watres bill which changed the pay basis from poundage to space and mileage. Unintelligently administered, the law might act as a boomerang, harming the very interests which it has been devised to help. In this matter lies a big job that needs attention and thoughtful effort.

Let's go slowly Mr. Postmaster General, for we won't be so likely to hurt ourselves—and we may go farther by proceeding discreetly.

THE TREATY AND THE AIR

IN GENERAL, the newspaper press of the country favors the London treaty and the naval building which it authorizes. Air-minded citizens of the United States are by no means necessarily anti-Navy; and that is far from AERO DIGEST's stand. But it is well for all of us to bear in mind the facts stated tersely by the New York *World*:

"The treaty authorizes a building program . . . so big that there is grave doubt whether the whole of it can be carried out during the life of the treaty . . . an expenditure of money which even this rich nation will have to scrutinize with care."

And other things must be considered.

What the delegates to London (not only from America but elsewhere), the newspapers of the United States, the American Navy Department (as was to be expected) and Congress (apparently so far) all seem to overlook is the fact that the "vast expenditure" of many millions is all to be devoted to the construction of steel sea-surface ships, all sinkable by any enemy in a bombing airplane (come overseas on a carrier and launched from its decks at a convenient distance from the opposing fleet) as easily as the captured German ships were sunk off Chesapeake Bay a few years ago by Army fliers. This practice stunt worked so effectively that the bureaucrats in Washington were so dismayed that for a few days they could do nothing but endeavor to keep the damning facts out of print.

It would have been a brave thing for our delegates to London to have brought up the whole matter of aircraft defense. A stupid thing for Congress to do now would be to authorize an expenditure on probably useless steel warships so vast as to bend the backs of taxpayers until they will naturally feel unwilling to bear the comparatively slight further burden of providing the United States with an adequate air defense.

MEDICAL ASPECTS of SAFE FLYING

Louis H. Bauer, A.B., M.B.

Medical Director of Aeronautics
Department of Commerce

AVIATION medicine, as it has come to be universally called, had its origin in the World War. It was found that the ordinary physical examination required for other branches of the Army and Navy did not suffice for those in the flying arm of the service. It has been said numerous times that the British found sixty per cent of their air casualties were the result of physical defects of their pilots as against only two per cent because of the enemy. The adoption of a more rigid physical selection and constant medical supervision resulted in this figure being reduced in two years from sixty to twelve per cent. It has also been stated that during the war a flier (if not killed first) was good for only 150 hours over the lines before he became totally "washed out" physically.

During the past ten years a great amount of experience has been added to that of the war, and much research has been accomplished. Mistakes have been made and perhaps are still being made, but I think it is no exaggeration to say that accidents from physical causes are a rarity in both our Army and Navy, and are becoming more and more rare in civilian flying.

During the war a foreign flier went up to try out a new plane against the earnest solicitation of a flight surgeon. The doctor knew he was convalescent from influenza and in a state where his judgment was unreliable, his attention easily distracted, and carelessness prone to develop. He disregarded the advice, however, and was killed. This could hardly happen now. The cases of service fliers with demonstrably serious eye defects who crashed in exactly the same way that the flight surgeons predicted they would if allowed to continue flying, could hardly be repeated today. When the physical examination of civilian students became necessary, air accidents caused by students subject to fainting attacks or epileptic convulsions were obviated. In 1927, of civilian air accidents, seventy-five per cent were in the case of unlicensed pilots and forty-one per cent had never been physically examined.

Man has become adapted over centuries of existence to a terrestrial environment. As a result of modern aviation he is subjected to a new and rapidly changing environment and one calling for quick decisions. He calls into play physical factors he did not know he possessed. He travels at terrific speeds and has to compensate for the diminished oxygen of high altitudes, for intense cold, violent winds, intense glare, and marked disturbances of his equilibrium. He is subjected to conditions which are fatiguing from both physical and nervous standpoints.

Physical requirements for pilots are becoming standardized the world over, although methods of testing these differ.

The physical examination of pilots may be divided into four classifications, each of which we will consider briefly. First let us give attention to the eyes.

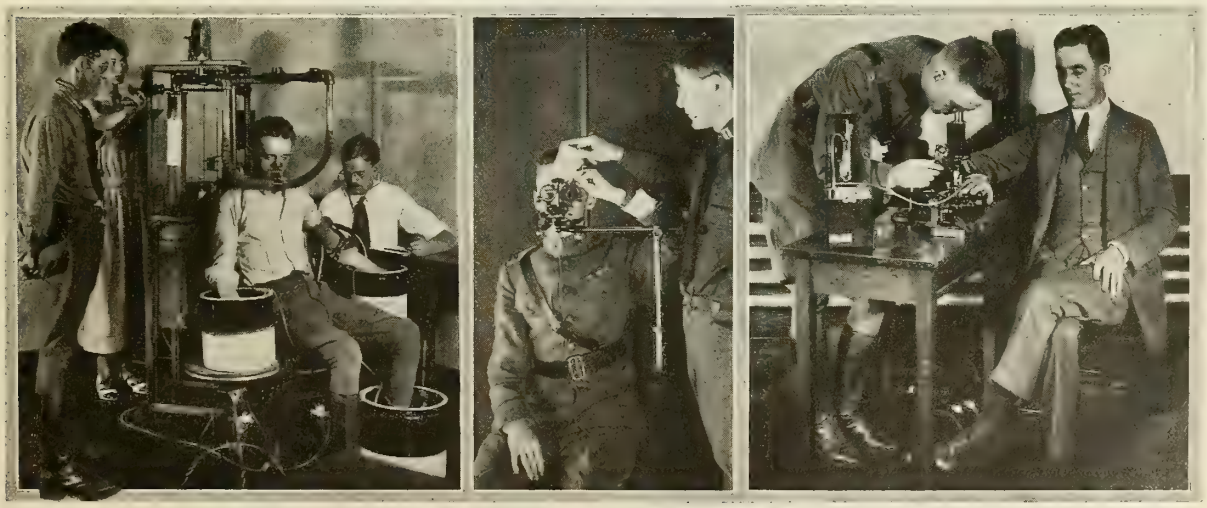
Good vision is essential, because the pilot must constantly watch the sky for other planes. He must see the ground and obstructions clearly. Poor vision interferes with his ability to judge distance. When two planes are traveling towards each other at over 100 miles per hour, the time elapsing after they first sight each other until they meet is very short. Hence it is essential that the eye pick them up as early as possible. In military flying the eye is even more important.

The pilot is constantly called on to judge distance in landing, taking off and in formation flying. He has to judge his distance from the ground, buildings, trees, telegraph and light poles, and other planes.

Good eye muscle balance is essential because it, also, is involved in the judgment of distance. Imbalance likewise produces a vicious circle of fatigue, headaches, inattention and carelessness, and the ever-present danger of double vision.

Normal visual fields are important because the flier not only must see straight ahead, but must be able to pick up objects out of the tail of his eye. This is especially important to the combat flier. Constricted visual fields are also associated with difficulty in night vision.

Color vision is important because the flier must detect navigating lights on other ships, colored lights on the airdromes, colored signal panels and lights, his map is often printed in colors, and most important of all, the different



Some of the physical examinations given prospective pilots: Left, altitude test; center, eye test; right, observing capillary circulation

shades of green and brown indicate to him the character of the terrain and aid him in picking out an emergency landing field. Recently the question has been raised as to whether or not color vision is an aid in judging distance. In Connecticut two partially color-blind students were said by their instructor to be helpless so far as landing the plane was concerned. Whether or not their color-blindness was the important factor can only be guessed at, but it raises an interesting question for future study.

A certain amount of accommodation is desirable—that is, the power to focus from far to near and back again—else the flier can read neither his map nor instrument board.

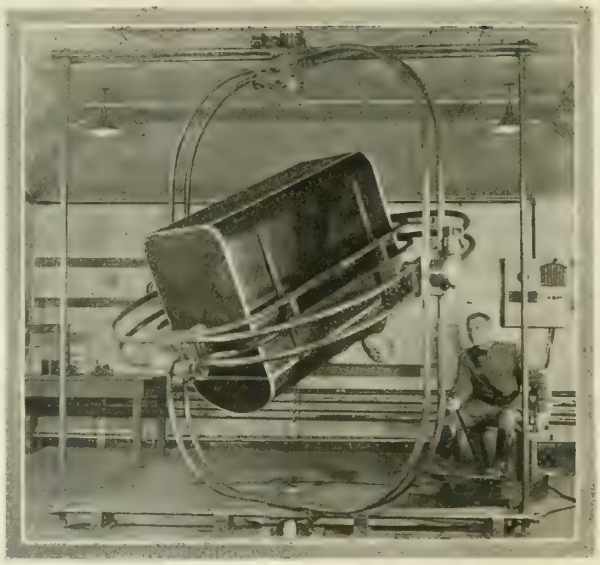
The question is frequently asked, if a pilot's vision is fully corrected with glasses, why do we reject him if his uncorrected vision falls below a certain standard? The anwser is, in a trained, experienced pilot we do not, but almost invariably grant him a waiver. In a student we require, to begin with, only a little less than half normal vision, which we wish corrected approximately to normal. The wearing of glasses under goggles is not approved for the following reasons: The flier has to look through two panes of glass. Furthermore, the lenses of glasses are small in comparison with lenses of goggles. So long as he looks straight ahead such a person has good vision, but if he turns his eyes to one side, he has blurred and distorted vision. The grinding of corrections in goggle lenses has been done satisfactorily in a number of cases, but often the results are not satisfactory, particularly with large corrections. Granted that the correction is satisfactory, there are many times when goggles become misted or smeared with oil. If the pilot is about to make a landing and this happens, he tears off his goggles. We feel that the pilot should have enough vision to get his ship back on the ground without his correcting goggles. A man whose vision is so poor that he cannot see the ground is certainly helpless and a dangerous flier.



Testing depth perception

We now come to the ear, nose and throat. We find that diseased conditions of the nose and throat light up in acute infections under exposure and fatigue. Obstructive conditions interfere with free breathing and also are apt to hasten infections. Hearing is not particularly important, but the pilot should be able to hear his mechanic say "contact" and "switch off" or other directions.

Equilibrium may be considered here, though it properly belongs under several headings. The eyes, ear, deep muscle and visceral sensations, and effects of gravity all play a part in maintaining our equilibrium. Abnormalities of equilibrium, particularly a hypersensitiveness to motion, are a hazard to the pilot and such conditions should be eliminated. Sensitivity to motion has a relation to safety other than that pertaining to defects of equilibrium. The work of Ocker and Meyers has proved conclusively that instrument flying under blind conditions of darkness or fog is more reliable than flying according to one's sensations. The reason for this is that our brain gives us faulty information. For example, after being turned to the right and the turning stopped, one has the sensation (if he cannot see the horizon) of turning to the left.



Ruggles Orientator for ascertaining reactions under conditions simulating actual flight

The next part of the examination is a general physical examination. This includes looking for structural defects such as would interfere with the handling of the controls of plane, organic diseases of the heart, lungs, circulation, kidneys and other viscera. These diseases lower resistance, increase susceptibility to fatigue and render the flier unreliable from a physical standpoint. It has been found that the flier who is suffering from any organic disease or convalescent from the same is a danger to himself and others when in the air.

Finally, we come to the nervous system. This is the system of the body subject to the greatest wear and tear. All organic diseases disqualify, such as mental disease, paralysis and epilepsy. Also functional diseases of any consequence should disqualify. The neurotic type of individual does not last long. He also is the type that "freezes onto the stick." Hence, effort is made to eliminate all those whose past histories show they do not react well to stress of any kind either physical or emotional. The Army has found that a large percentage of the men it has had to ground after selection are so grounded because of defects of the nervous system. When the nervous system is upset, the whole physical mechanism is apt to go wrong.

The standards to be adopted will naturally vary with the types of work to be done. The Army and Navy will have the highest standard because they require their pilots to be fit for any military duty, and this causes rejections for defects that have nothing to do with flying. Then, too, they take their pilots more or less for life. Next highest will be the standard for passenger-carrying commercial pilots. Then comes the industrial pilot, and finally the private pilot.

It should be clearly understood that when an applicant is physically disqualified, we do not mean to say that he could not learn or continue to fly. We do say, however, that the hazards in his particular case are increased over and above a reasonable amount.

Before taking up the physical requirements of more special situations, let us consider the necessity of periodic physical examination and (*Continued on page* 194)

THE VERTICAL DESCENT

Dr. Max M. Munk
Consulting Engineer

IN this article I shall discuss a subject that has recently received much attention from progressive aviation engineers—the magnitude of the drag on a propeller that is spinning and descending under the action of gravity.

My first autogiro paper of 1922 describes tests only and gives the results of these tests. The reception it found within the organization which ought to have protected it, discouraged me at that time from giving further thought to the matter. After reviewing the paper briefly, I shall add another interesting theoretical contribution suggested by one of the several facts first brought out in that paper.

There were three principal new facts introduced in my autogiro paper of 1922; others may become prominent later. In the first place, this was the first paper in which the attention of engineers was invited to the fact that a freely spinning propeller may be used as a substitute for the ordinary wing.

In the second place, the tests show the direction of rotation of the propellers to be opposite to that which was at that time commonly supposed; the autogiro propeller rotates in the same direction as a helicopter propeller of the same shape.

The third result of these tests was the experimental proof of the large-parachute effect of autogiros; the drag of autogiros descending vertically may be much greater than the drag of plane discs or of parachutes of the same diameter. Because of this fact, the vertical descent of heavier-than-air craft is brought into the region of practical possibility. It is this third feature of the paper which I wish to discuss on theoretical grounds in this article.

We consider an autogiro propeller descending vertically with the velocity V under the action of gravity. The diameter of the propeller may be D, giving the disc area $S = D^2\pi/4$. The propeller thrust may be denoted by T, and during a steady descent it is equal to the weight of the autogiro plane. The problem arising is: Is there a theoretical maximum of the thrust, if the diameter and the density of the air are given; and if so, how large is the theoretical thrust, and the velocity of descent?

The problem is rendered simpler and clearer by the introduction of the so-called thrust coefficient, or drag coefficient, C_D. This is the thrust, or weight, or drag, divided by the area of the propeller disc, S, and by the dynamic pressure of the velocity of fall. This latter dynamic pressure is equal to the product of the square of the velocity and of half the mass denisty ϱ of the air. Accordingly, the drag coefficient is equal to

$$C_D = \frac{D}{S \quad V^2 \varrho / 2}$$

The significance and importance of the drag coefficient rests on the physical fact, borne out by experience and supported by theory, that this combination of the quantities involved is nearer to constant than any other simple combination. It does not rest on its more or less clever and ingenious definition. Over a very large range, the drag coefficient can be considered as absolutely constant for most practical applications. It is therefore possible and practical to discuss the drag coefficient as an absolute physical constant, the value of which is independent of and has no reference to any particular density of the air, velocity of the fall and diameter of the propeller.

In order to apply the drag coefficient C_D to actual design problems, we have to reverse the above equation of definition of C_D. We obtain then

$$D = C_D V^2 S \varrho / 2$$

and

$$V = \sqrt{\frac{W}{C_D S \varrho / 2}}$$

The supported weight is thus demonstrated to be proportional to the drag coefficient, to the area, to the density, and to the square of the velocity. The velocity of fall is proportional to the square root of the weight, and inverse to the square root of the drag coefficient of the area and of the density of the air.

From all equations follows the desirability of a large drag coefficient for vertical descent, quite contrary to the drag coefficient requirements of structural parts of aircraft for ordinary flight. A drag coefficient four times as large allows half the velocity of fall or one-fourth of the parachute area.

After these explanations, the problem of the vertical descent is reduced to the question: How large is the largest drag coefficient obtainable by a parachute, or, in this case, by a freely spinning propeller? This question asks for an experimental investigation, and subordinated to it is the question: Does a theoretical maximum value of this drag coefficient exist, and if so, how large is it?

Some persons have advanced the opinion that the maximum drag coefficient theoretically possible is equal to ONE. They assume the propeller to move through resting air, and to transfer the velocity of fall to all air passed within the cylinder with the propeller diameter. It is true that this gives formally the maximum drag coefficient ONE, but the argument and this drag coefficient are not convincing. The argument should never have been advanced, because it has long been known that the drag coefficient of discs and of strips is larger than ONE. The autogiro paper of 1922 cited above gives 1.7, not for the maximum drag coefficient thinkable, but for one actually obtained in a test. Flying tests with autogiros are reported to indicate drag coefficients as large as FOUR. There is indeed no reason why the air should not be accellerated beyond the velocity of fall, and the argument leading to the value of ONE seems to be poorly founded.

De la Cierva, in a recent paper, comes back to this anomaly, as it seems to him, still under the influence of the doubtful argument just discussed. The vortices are conjured up in order to show that a propeller slipstream with diminishing velocity diverges, a fact which is more readily seen, without vortices. There are also smoke tests cited in support of that obvious fact. De la Cierva's explanation is finally that the factor ONE is correct, but the reference area should be taken larger than is ordinarily done—not equal to the propeller disc area but equal to the final cross-section of the propeller jet.

The matter appears in a different light to me, and I shall proceed now to discuss my explanation and to deduce a numerical value of the maximum drag coefficient consistent with theory larger than ONE. I shall avoid carefully all vortices and similar difficult conceptions, excusable and even useful for mathemati- (*Continued on page* 182)

THE SEASON FOR CONTEMPLATION

Don Rose

WHENEVER two or more enthusiasts get talking together on aviation, the innocent bystander needs to figure what level they are cruising at before he trails along with them. The art of air-minded conversation lies in knowing your ceiling. If you are talking, for instance, with an air-field operator who is two jumps ahead of the sheriff and one ahead of his stockholders, it will be just as well not to discuss the need for bigger and better airports. If you are exchanging aerial amenities with an old-time Army pilot, don't bring up the subject of dirigibles. But if you are talking with a feature writer for the Sunday magazines, go as far as you like. If your imagination stalls on you anywhere short of Mars or the Moon, you just aren't trying.

When aviation was young and innocent, anything that was said about it would do to help the cause. But now the gulf has widened enormously between fact and fancy, between reality and romance. Aviation is a going concern, with a definite work to do and reasonable laws and profits. It knows what is practical, what is probable and what is possible. It can afford today to leave the fantastic to the fiction writers, having plenty of interesting and perplexing problems to attend to in the realm of hard-boiled fact.

In the same fashion the substantial business of aviation is perceptibly growing impatient of useless or unnecessary performances, even though an airplane may be somehow involved in them. It should be a rather slim reason for stunt flights and mere publicity seekers. The average business man in aviation has a right to ask the 1930 model stunter or even the record-breaker to try something really difficult. Let him try, for instance, to make a transport line pay real dividends under present conditions. Let him try to move Congress another five inches in the direction of adequate aerial defense. Let him try to improve the plane market to catch up with improved and increasingly competitive production. If anyone will attend to one or more of these splendid opportunities for an ambitious young man, he will be a better friend to the industry than the first man who makes an inverted loop in a motorless glider and lives to write a book about it.

Nevertheless, the season for contemplation is here again. This season coincides almost exactly with the time of year when the newspapers run out of politics, business reports and convention news. It used to be called the silly season, but now it is the season for contemplation,—for the contemplation of stunt flights undertaken for the sake of the publicity deriving from them.

The public needs a stiff dose of realism just now in regard to aviation. It needs to get back to hard tacks, and to sit on them until they hatch into progressive ideas. It needs to forget the fantastic future, and to learn the lessons of the present. It needs, in fact, to do a little contemplating of problems which are real and earnest to every serious worker in this trade.

I've been doing a little reading lately, having caught up on my knitting and survived a Pennsylvania primary campaign, and this is what has come of it. I'm in an uncommonly sober mood, and it's General William Mitchell's fault. For the Lippincott Company has just published one of the best books on aviation that ever came from a pilot's pen, and its title is "Skyways" and its author none other than the General himself. And if you can read and care to do so, you should borrow three dollars from the nearest grease monkey and buy yourself a copy.

A complete library of aeronautical literature now takes up a lot of room and includes everything from the war diaries of aviators in active service at Kelly Field to practical instructions for building dirigibles in the back yard. But I don't know that anybody has covered so much territory between a pair of covers as has General Mitchell in this book, nor done so with such plain-spoken sincerity and simple sense. It's a layman's book, of course, and entirely suitable for Boy Scouts, tired business men and the weekly meetings of the Ladies Literary Club. But it has authority, it is consistently interesting, and it wastes no time with words that don't count. When you get through, you wish there was more of it, which—as Sam Weller almost said—is the whole art of book-writing.

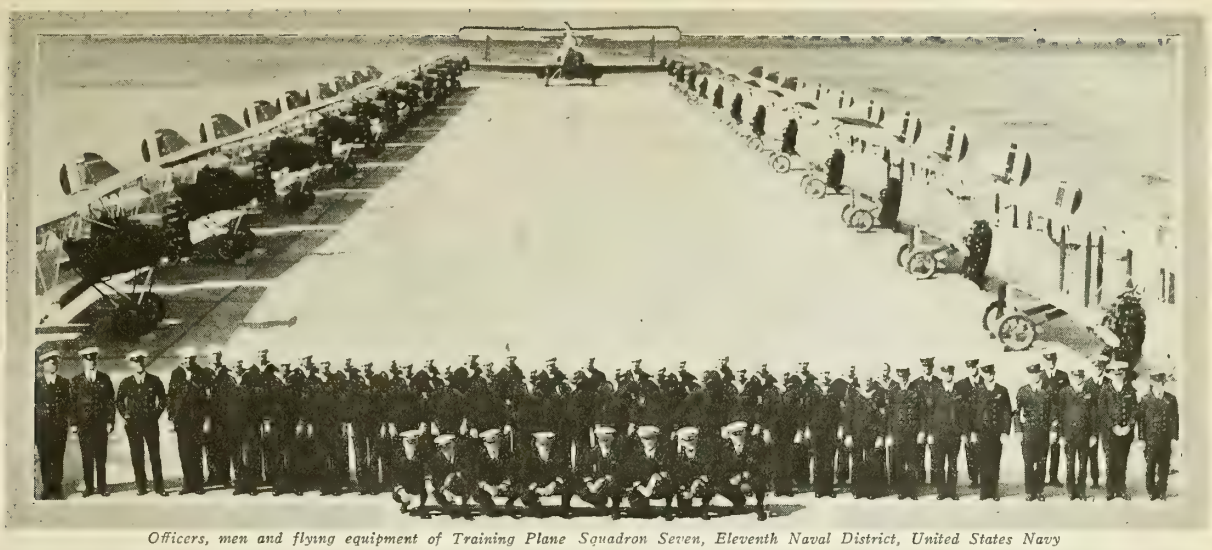
General Mitchell's sight is uncommonly keen, and his eyes are unclouded with prejudice or preconceived notions. When he contemplates, as he does more or less throughout his book, he contemplates to some purpose. He isn't just trying to please the customers, nor to paint rainbows around his favorite profession. He isn't selling anybody's stock nor aiming to say a kindly word for his numerous friends or an irritating one for his numerous enemies. He just says what he sees, and he can see far, wide and deep.

I couldn't help notice how little space he spared for the stunters and the publicity hounds. They just don't fit into his story; they aren't within the range of his contemplations. General Mitchell writes of what an airplane is and how it got that way. He writes of airships for what they are, and not for what the Sunday supplements think they should be. He writes of the making of a pilot, the flying of a plane, the building of an airport and the laying out of airways, in the light of a realistic experience and not of a romantic imagination. And he writes of war as a grim and deadly business, in which victory belongs to those who earn it and not to those who think they deserve it.

You will come out of his book with pride for aviation's record of performance and progress, and with an equally keen sense of what remains to be done. You will discover, for instance, that an airplane is still an imperfect tool for the work which waits for it, a clumsy tool, an expensive one and not a perfectly safe one by any means. You will realize how much depends at this moment on the discovery or development of a device which will tell how close to the shore a ship of the air is cruising and what the coast is like. You will learn the importance of beating the fire devil, of making good pilots into better ones, of cutting the cost of getting from here to there by air. You will discover how many good ideas go wrong, and how many unpromising ones are slowly hammered into useful shape and condition.

But there are two phases of the General's contemplations which overshadow the rest of the book. The first has to do with comparative conditions in aeronautics, contrasting what Europe has done with what America is trying to do.

It's not nice to be compelled to admit that this nation is ever caught flat-footed. But it is difficult to dodge the conclusion that the country which saw the first airplane fly must look across the sea to discover what came of it. I am aware that every now and then someone publishes a lot of figures to prove that America leads the world in aeronautics, that airplanes fly higher and farther here than anywhere, that our airways are longer and our air mail system more comprehensive than anything on (*Continued on page* 204)



Officers, men and flying equipment of Training Plane Squadron Seven, Eleventh Naval District, United States Navy

TRAINING the NAVAL AIR RESERVE

Lieut. H. B. Miller, U. S. N.

THE attention of Congress became acutely focused on aviation some years ago with the demands for a united air service. Various claims for its military effectiveness were made. An equal number of counter claims were offered. No definite conclusions were reached, but once and for all the influence of airpower made itself felt.

As a result of this agitation, the Morrow Board, so called in honor of its chairman, was appointed by President Coolidge. This committee was composed of men prominent in all phases of public life. The purpose of the board was "to make a thorough study of the best means of developing and applying aircraft as a means of national defense." All pertinent data were made available to this group of men. Practically every prominent aviation authority in the country was given an opportunity to express his views and ideas on the subject. Personal inspections and investigations were made. The findings of this board for aerial defense investigation were submitted to President Coolidge in December, 1925.



Seaplane beach, Naval Air Station, Pensacola, Fla.

One of the direct results of the report was the passing by Congress of the Navy Five-Year Aircraft Program Act, which provided not only for additional aircraft, but for an expansion of personnel to operate these planes. Further, appropriations were made for sufficient spare parts and ground equipment to maintain the increased number of aircraft.

At the end of the prescribed period, the Navy is required to maintain 1,000 planes ready at all times for service operations. In order to sustain the naval air fleet at this strength, it is provided that 333 planes may be purchased annually after 1932 at a cost not to exceed $17,476,270. Further, pilots to operate these planes must be available at the completion of the program. Of these aviators at least thirty per cent are to be enlisted men.

The rate of expansion of the number of planes in Navy's air service and their costs was, by the terms of the Five-Year Aircraft Program Act, to be as follows:

Year	*Airplanes*	*Cost*
1927	235	$12,285,000
1928	313	16,223,750
1929	335	17,582,500
1930	357	18,941,250
1931	374	20,046,250

The Naval Air Station at Pensacola, Florida, is the sole source of pilots for naval aviation. The normal procedure in the past was to put through two classes with from seventy-five to a hundred members each year. Of this number, approximately forty-five per cent normally completed the course.

Then, as now, experienced pilots were in great demand by civilian aviation companies. Enlisted pilots failed to re-enlist and many commissioned officers resigned to take advantage of greatly increased salaries. These losses, combined with casualties occurring in line of duty, resulted in an average attrition of about thirty-eight pilots annually.

The total number of pilots in the Navy on June 30, 1927, was 580. It was evident that if the normal rate of increase were to remain constant, on the fifth year of the building program the Navy would be far behind its schedule. Obviously, to keep up with the pace of this rapidly enlarging program, increased training activity was necessary.

Three courses of action were possible: sending more flight candidates to Pensacola; graduating a larger percentage of students; or enrolling aviation applicants from the civilian world.

All three plans are now being undertaken. The number of classes entering Pensacola annually was augmented to four. This has since been increased to one class of sixty students each month. In addition, by intensive instruction a larger percentage is now successfully completing the course.

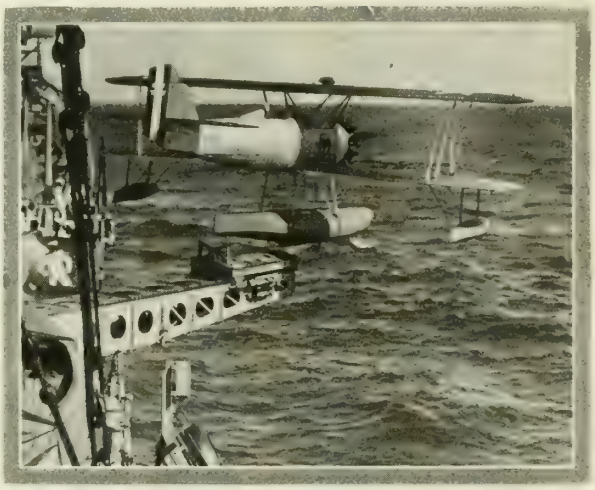
For some years the Navy has maintained Reserve Training Stations at Sand Point, near Seattle; Squantum, Massachusetts; Rockaway, Long Island (temporarily at Curtiss Field, Valley Stream); and at Great Lakes, near Chicago.

Under the old system, seniors and graduates of colleges were given flight training after fulfilling certain qualifications of citizenship, and passing examinations for physical and mental fitness. After successfully completing the course, these men were given a professional examination. If found qualified, they were commissioned as ensigns in the United States Naval Reserve. Here their progressive training stopped.

Their flight training was only of the preliminary type. If they were fortunate enough to live close to a Naval Reserve Station, they could put in extra flying time. If not so situated, they did no service flying except during the annual two weeks active duty which they were required to perform.

A new system was given a trial in the summer of 1927. Fifty of these reserve ensigns were distributed throughout the Fleet for one year's active duty. As officers, they went to all types of service squadrons from fighting to observation and bombing units.

Considering the amount of experience these young officers had, this experiment was quite successful. A fed had several hundred hours flying time obtained in commercial aviation. For the most part, however, they had from seventy-five to a hundred hours. The average time consequently was slightly over one hundred hours. The handicaps of a hundred-hour aviator in a fighting squadron may well be imagined. Casualties among this group of Reserves were rather high.



Navy Vought seaplane being catapulted from a cruiser

Variations of this plan continued until the summer of 1929. Then it was decided to give a more complete training to Reserves. At the present time they are put through a course identical to that given to the regular Navy officers and enlisted men. This system is contingent upon Congressional appropriations.

The new training course resolves itself into four phases as follows: (1) ground school as a civilian; (2) flight elimination course as an enlisted man in the Reserve; (3) Pensacola flight course as an enlisted man in the Reserve; and (4) one year's active duty as a commissioned officer in the Fleet.

Ground schools are maintained at the following universities and colleges: Massachusetts Institute of Technology, New York University, Temple University, George Washington University, University of Michigan, Armour Institute, University of Minnesota, University of California, University of Southern California, University of Washington, Georgia School of Technology, and Miami University.

The subjects covered in the ground school courses are:

Aerodynamics—Airfoils, sections and characteristics; parasite resistance; stability, controllability, maneuverability, and performance. These are based on Monteith's, "Simple Aerodynamics and the Airplane."

Aircraft Construction and Equipment—Materials; shop processes; aircraft instruments; design; construction; assembly and alignment; inspection and tests; maintenance; accessories; operating facilities.

General Information—Aerology; history and development of aviation; military, civil and foreign aviation.

Aerial Navigation—Dead reckoning; the well-known Weems and Pierce methods of celestial navigation as applied to aircraft operation.

Sea Navigation—Navigation and nautical astronomy.

Aviation Engines—General principles; the mechanical system; fuel, lubricating, ignition and cooling systems; fuels and oils; service type engines, maintenance.

Navy Regulations—Naval customs and indoctrination.

Practical Flying—Indoctrinal lectures.

Radio Code—Seventy-five hours of code practice; this should insure a sending and receiving speed of fifteen words per minute.

(*Continued on page* 184)



Left, Consolidated NY2 training plane for instruction in seaplane flying; right, Curtiss F6C-4 for advanced training

CAUSES AND PREVENTIONS OF FLAT AND INVERTED SPINS

(PART 1)

By

Garland Powell Peed, Jr.

THE subject of flat spins is being brought to our attention very strongly at present, with new designs doing the unexpected more and more frequently, with normal staggered biplanes and newer experimental monoplanes spinning fifteen, twenty-five and more times out of control, and pilots coming back with stories of strange behavior. From all of this has started the story of the "deadly flat spin."

The matter of inverted spins is entirely new to all but a very small percentage of us. The average pilot does not care to investigate this maneuver. Since the inverted spin is, however, as an almost ironclad rule, a true flat spin, I have classed them under the one head. There is available little exact knowledge of either, and the greater proportion of what does exist is false or misleading. It is not my purpose in this article to go too deeply into this subject; the subject is so comprehensive, and so much of it is still experimental, I can merely touch the high points. I saw my first flat spin in the latter part of 1924 and only a few months ago reached the conclusions I am giving here. Many times I have had a firm belief in some idea, only to find later that I was distinctly wrong, and it is entirely possible that some of these ideas may also be wrong.

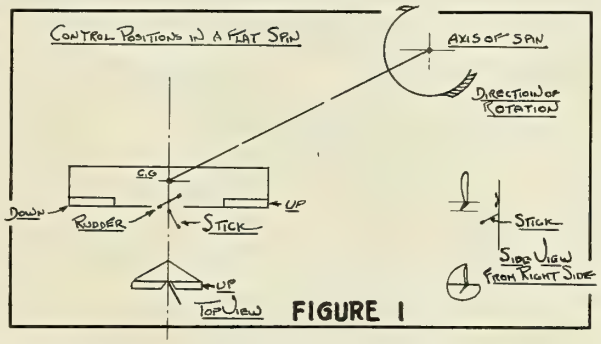


FIGURE 1

The term "flat spin" is very misleading. The flat spin may or may not be flat; the attitude of the plane has nothing to do with its spinning properties. A ship in a true flat spin may be spinning at an angle of 45 degrees or more to the horizon. This name, emphasizing the position of the ship, sounds dangerous and unfamiliar, tending to the belief that this is some entirely new and unexplainable maneuver. Much of it has been unexplainable, but it is not by far as dangerous or uncontrollable as it has been pictured. It differs from the normal spin only in the matter of degree. The worst that can be said of it is that it is *almost* uncontrollable. There are probably individual ships that are absolutely uncontrollable, but it is very doubtful that this is due to flat spinning alone. In many cases, the pilot has only the vaguest ideas of what constitutes this maneuver—and no idea at all of how to recover from it. In other cases, insufficient altitude or structural failure has played a part.

The flat spin is not in itself extremely dangerous, provided the pilot knows absolutely what is happening and the correction necessary and provided he has sufficient altitude.

Usually, though not by any means necessarily, a ship makes one or more turns of a normal spin before "going flat," and there is no definite change of attitude immediately discernable to the pilot. In the controls, however, there is a positive indication. The stick pushes back against the pilot and the aileron on the inside of the spin blows up, throwing the stick towards the center of the spin. (Figure 1.) The force exerted by the stick may be very high, reaching values as great as 150 pounds or more, necessitating considerable effort on the pilot's part to return the stick to neutral. The ship then flattens its spin to some degree. In the spin the ship may be at almost any angle to the horizon, from perfectly flat to 45 degrees or more, the only condition for the flat spin being that the control forces are reversed. As long as there is a forward pull on the stick, the ship is in a normal spin, no matter what the attitude. Once the flat spin has developed, the stick will remain towards the rear, or in inverted flight towards the front, and will be towards the inside of the spin. The rudder will be forward on the inside, and all controls will remain in these positions.

For recovery, all controls must be moved directly to the opposite position and *held there*. That is to say, that in a right flat spin, the correction is to put the stick full forward and full to the left and apply full left rudder—*and hold them there*. (Figure 2.) This takes quite an effort, and it is entirely possible that many crashes in flat spins have been the result of the pilot's inability to hold the controls in this position, for any slackening up would mean the resumption of the spin. It is probable that a woman or a slight man may be physically unable to reverse the controls, and thus would be unable to recover to normal flight.

During the spin the ship may make a very tight spiral, usually coming down very slowly and making as many as two turns to 100 feet. Again, the ship may be at an angle of 45 degrees to the horizon and dropping 300 feet a turn. It is impossible to state any definite rule, for two ships may spin entirely differently—though each is in a true flat spin. The very flat, slowly descending spin occurs in the greater majority of cases, and the rate of descent may be so low as merely to jar the pilot when landing.

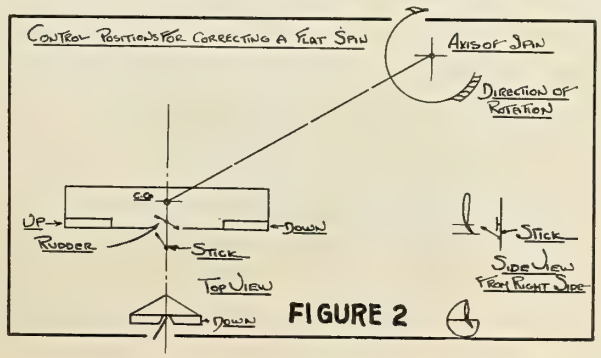


FIGURE 2

Because of the wide range of planes, it is necessary to be rather vague. Two such different ships as a high performance, high speed biplane military fighter, with 15 per cent stagger, and a low-wing, high lift commercial cabin monoplane, would seem to have nothing at all in common, yet both flat spin. Very shortly after the National

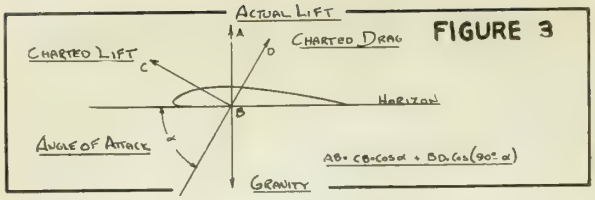


FIGURE 3

Advisory Committee of Aeronautics issued its Report No. 273, in which the first conclusion reached was "a monoplane is incapable of flat spinning" several did. All of these ships must have lacked one quality for true stability.

In investigating flat spinning characteristics, I found an almost complete lack of data useful to such a study. For example, I could find only two reports dealing with force curves of wing sections at high angles of attack, and from these could find test results from but four sections, of which one was a modified section, one was older and seldom used, and one was of too low a lift to be of any value. The fourth section was the only one being utilized to any extent today. For this reason, many of the results here shown may be subject to modification later.

There is a great need for systematic study of force curves at high angles of attack with special reference to aspect ratio and the use of slots and flaps. Because of the limited data available, I cannot begin to go as deeply into these subjects as I should like. The results I have reached have been based mainly on actual experience and considerable and checking of the data at hand. I am not, at present, able to confirm these results in the wind tunnel, but the principles laid down have been accurately checked, verified in actual practice and found to be usable. Some results have been very surprising and directly opposite to what had been expected.

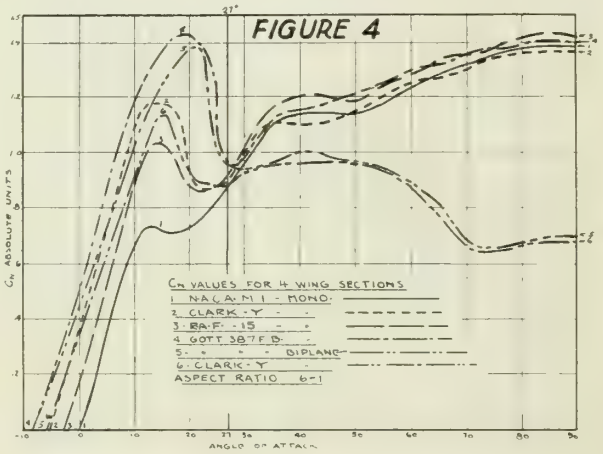


FIGURE 4

In this article, for simplicity in treatment and ease of understanding, all spins discussed are to the right, or clockwise. Spins to the left are, neglecting propeller action, equivalent and opposite. Motor torque is added or subtracted from the moment progression as indicated.

In the study of spinning characteristics, we find that the angle of attack may vary considerably along the span of the wing—so that the outer wing tip may be at an angle of zero degrees and the inner at 65 degrees. The lifts at angles of zero to 20 degrees are easy to calculate from present tables, but from 20 to 65 degrees have not been investigated sufficiently to indicate just what is happening at these angles.

In an airplane the mean angle of attack of which is 30 or more degrees, the attitude of the airplane would be almost parallel to the horizon. (Figure 3.) In this case the actual lift on the plane would be opposite to gravity or perpendicular to the thrust line. (A-B Figure 3.) The lift and drag coefficients, however, as shown on section reports, give the lift as perpendicular to the air flow. (C-B Figure 3.) Obviously the lift and drag values given on the usual section reports are of no value at high angles of attack. An airplane lifts against gravity, and spinning is a resultant of gravity. Then, as for the purpose of these calculations, the actual attitude of the plane may vary so considerably—and therefore call for such an extended study—that I am only treating two cases.

The first is that of a ship spinning with its wing chord line parallel to the horizon. In this case the lift is normal to the chord line, and it is possible from the C_L and C_D of any section to calculate the normal or actual lift of the section in terms of coefficients, and since this is normal to the chord line, let it be called C_N. Then:

$$C_N = C_L \cdot C_{os}\alpha + C_D \cdot C_{os}(90 - \alpha)$$

where alpha (α) equals angle of attack.

It is obvious here that this condition is extremely rare or even could not exist in actual flight in present aircraft. The radius of such a spin would be so small that the fin surfaces would be able to revert the ship to a straight, even though highly stalled, path. This condition is analogus to the windmill effect observed at angles near 90 degrees in wind tunnel spinning tests. However, this is the easiest condition to investigate because of the greater lack of variables, for which reason I am using it. Such a condition would probably occur in the true flying wing type without tail surfaces, and so would be a question of future danger rather than present.

The second case is that of a ship spinning so that the longitudinal center chord line of the wing is at an angle (φ) to the horizon and an angle of attack of (α) degrees, in this case using $C_N\varphi$ as the coefficient. Then:

$$C_N\varphi = C_L \cdot C_{os}(\varphi+\alpha) + C_D \cdot -C_{os}[90^\circ - (\varphi+\alpha)]$$

I have not tried to chart these values because of the impossibility of determining the value of phi (φ) without knowing the full characteristics of the ship being investigated. However, the values of C_N are easy to calculate.

Figure 4 shows these values for four common wing sections in two arrangements. Here note that the C_N values are divided into two parts. Below 27 degrees there is a wide variation of C_N values (from .74 to 1.43), showing variations between low and high lift sections. Above 27 degrees, all of the monoplane arrangements cluster extremely close together and similarly with biplanes. This is so marked as to enable us to say (subject to further experimental verification, since there are several unexplained variations for this rule) that for any one plan form the sectional C_N values (*Continued on page* 204)

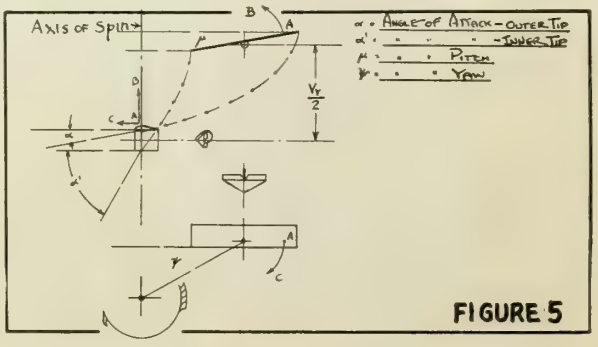


FIGURE 5

PERSONAIRLITIES



BY

by Caldwell

STEVE DAY was in Birmingham, Ala., selling roofing when the war broke out. Being used to altitude, the Air Service was the natural thing for him to go into. He'd started in the Artillery, but the mathematical calculations necessary to decide where a shell was going to land were so much more complicated than figuring out square feet of roofing, that Steve quit the Artillery, gave them back their slide rule, and took to the air, via the Observers' School at Fort Sill. There he organized the O. P. L., or Order of Permanent Lieutenants, which was composed of all officers who didn't know anybody important in Washington. They all started off as Loots and finished the same way—so far as the Air Service was concerned, they would remain Artillery Lieutenants forever.



Steve Day

Day went to Selfridge for aerial gunnery, then was sent overseas and assigned to 85th Observation Squadron of DH's. He observed that the war was no place for an ex-roofer, but couldn't do anything about it. And when they put him right in the line as liaison officer with the 7th Division, he could do even less about it. He was still sitting in the mud when the whistle blew on November 11. After that he was Operations Officer for 2nd Army Observation Group at Toul and Director of Aerial Observation School for officers of the line—who didn't like it.

In 1920, Day went to Omaha and met the late Charles Collyer, who was flying the mail from Omaha to Cheyenne. They helped put on the second Pulitzer, which Bert Acosta won. In 1927 Day and Collyer started the Aviation Service Corporation, New York, to export aeronautical equipment, buy and sell ships, and handle racing events.

A STUDENT pilot, apparently a better student of aviation than of spelling, tells all in a letter to me: "Hears the soup of my progress in aviation. A bout four years ago I started out on models and am now at the point of solo. Not in a model but in a DH Moth. My first kick in flying was when I took the air in a Waco. We just left the tarmac and altitude a bout 400 when the engine cut out. An OX-5 and wont I be glad when they are forgotten. Well we could not make the field back and so the softest spot was the foot of a Oak tree. Took the left section off of are airfoils and the landing geer. The other parts were beyon repare. Well after that thrill I decided flying was safe as I came out alive and so did my Pilot. I consider flying safer than riding with my Dad in a Ford. I get in a half hr. a week and my instructor keeps telling me wright along that I am doing good. It seams imposable but as long as they keep giving me that line a half and maybe a hour I will squeze in. Wont I have a chest when I Solo. That Moth will be a spinning prop when I get done with it. I got an awful stomack but flying is doing its best to outrope me. My first half hr. was a serous of left and right banks which just about tore my guts out. Did I pray for them lousy 30 minutes to come. But now I am getting over it. Its a tough life for a pilot to have a stomack like mine but I am sticking it out."

MIRIAM HOLLOWAY is the first girl born in the Hawaiian Islands to learn to fly, though she had not received her license when last I heard from her. Miss Peggy Drew is the first girl to receive her private pilot's license in Hawaii; and Miss Marian Pang, a Chinese girl, has taken the mechanical course with Hawaiian Aeronautical Industries.

Among the students at the school are several Chinese who plan to go back to China and enter one of the local wars that are so popular in that interesting country. Those pictured with Miss Holloway are Wun Punk Lung, author of "Me Fly Too," a treatise on the weak points in landing gears, from personal experience; Hoo Flung Mudd, who will go up on his second solo as soon as he has recovered from the effects of the first one; Wung Wing Lo, who specializes in upside-down flying (by doing half an outside loop immediately after landing); and Fling M. Hi, the Chinese Edison who recently invented a device for removing shirt buttons by machinery, thus saving the hands.



Miriam Holloway (right) and fellow-students

When the Bolshevik government learned that these Chinese students might fly for the Chinese government and drop bombs on the Russians, they were somewhat perturbed. But Ivan Awfulitch, Soviet Minister of War, immediately hired one Irish pilot and sent him to Manchuria in a Jenny. "All will be quiet on the Chinese front," commented Mr. Awfulitch.

HANCOCK College, Santa Maria, Calif., is the address of Frank E. Williams, who wishes some of his old friends would write him. He's just growing old gracefully there, flying Captain Hancock around and instructing cadets, and feeling grateful that he doesn't have to do any more of the sort of flying he did down in Louisiana. He says:



Frank E. Williams

"If you ever get stuck in Louisiana with the fog down in the top of the timber so you can't get over it, here's a good trick. Find a railroad going your way and wait until a train goes through the timber which is holding you up. The train burns out the fog up high enough to let you through above the poles. Provides an interesting tunnel effect. If someone should be tunneling from the other way, then it becomes a question of who has the right of way."

Does it, indeed? Not for me it doesn't. I'll have the right of way, because I'll be *on* the train, with a ticket in my hand guaranteeing me ground rights over any coot in an airplane plowing through fog. If Frank did much of that sort of flying, he's lucky to have reached California. He spent some time carrying calcium arsenate around in a Waco 9 to drop on Boll Weevils; he dusted 5,000 acres of cotton down there.

Frank Williams went to Brooks Field as a cadet in 1923, learned to fly and then got washed out because someone else had dived on a farmer's house, and Frank had got blamed for it. Was reinstated a year later, only to be washed out again because he flunked a written examination on machine

(*Continued on next page*)

(Personalities continued)

guns. He could take them apart, put them together again, and shoot with them—but he forgot the names of some of the parts, so out he went. He felt rather hurt at that, but got even with the Army by taking a Reserve commission in the Navy and being appointed assistant to the senior instructor at the Naval Air Station, North Island. After that duty he organized the Ambassador Airways, started a flying school of his own at Mines Field, and did test flying for the Kinner factory. He took a factory mechanic along to nurse the entries in the ladies' derby to Cleveland last year, of which he says:

"A few of those gals did some remarkable flying, but the rest of them kept us in a sweat wondering how long they would last. It was an occasion to inspire awe in the most callous heart when we sat on the field at Douglas, Arizona, and watched them come in from four points of the compass. One actually came in from straight south, out of Mexico. That was on the hop from Phoenix." Ah, we're learning secrets!

J. L. O'DONNELL of Long Beach, Calif., started his aviation career several years ago by taking two hours and forty minutes' instruction, after which he felt himself quite capable of taking a Jenny "from the original crate" and setting it up with the help of an equally experienced friend.



J. L. O'Donnell

"It was our first experience with construction, and so it was about three days before we considered the plane ready to fly. Incidentally, we had any number of gadgets and miscellaneous parts left over, which didn't seem to belong any place. So we loaded them in and started from San Diego for Los Angeles, a distance of 115 miles. Everything went fine until we got over Long Beach and I ran into my first bumps. I couldn't figure out what on earth was the matter, and if my recollection serves me right, they were about the worst bumps that ever existed. Old Jenny pitched and rolled, and I admit that I was beginning to entertain grave doubts—I even have a suspicion that my friend felt a trifle dubious, judging from his expression and considering that it was his first flight. By the time we arrived at our destination, the wings were doing everything but flapping. We got down to the ground after a fashion. The fellows ran out to greet us, and I'll never forget the bewildered expression when they saw who was flying. Then they looked the ship over. The bolt on the bottom of one of the end struts had fallen out, and the strut was just dangling in the air. There wasn't a cotter pin or a piece of safety wire on the entire plane; and a lot of the old-timers, including myself, are still wondering how I ever arrived all in one piece. Thus I was introduced to the art of flying!"

EARLY BIRDS

JUST to show you how much we've changed in seventeen years, read this account in the New York *American* of July 27, 1913.

"The simultaneous flight of eight aeroplanes above the aviation field at Garden City was considered the crowning feature of the Navy Day meet until the arrival of a pretty woman dressed in a sheer champagne colored dress with a dainty ankle peeping from the latest height slit at a side of the skirt.

"The two thousand pair of eyes that were fixed on the whirring aircars were almost instantly focused on the young woman. She leaned on the arm of Captain Ernest Bass and was recognized as Miss Provost, a cousin of Mrs. John Jacob Astor, who several months ago startled Brooklyn society by abandoning pink teas and a life of leisure to make her living on the stage.

"Miss Provost made a flight with an Army aviator, John G. Gilpatrick. It was her first ride in an aircar. She leaped lightly from the aeroplane when it descended after a ten-minute flight.

" 'You're the loveliest man in the world,' she cried, enthusiastically, and almost caressed Gilpatrick. 'I really think you are a hero.'

"To admirers who gathered about her Miss Provost declared:

" 'This was a new sensation. It was the first time in my life that my breath was taken away. I wasn't the least bit afraid, and I want to go up again as soon as I can.'

"She begged Gilpatrick to immediately take her up for another air jaunt, but he induced her to defer the trip."

Those were the days! Young ladies had their breath taken away on air jaunts in aircars. The modern girl often has a breath you can't take away with anything short of Listerine—and used full strength at that. And two thousand pairs of eyes turned from the whirring aircars to gaze at a dainty ankle peeping from a slit skirt! Just imagine the kick the boys got out of that glimpse. Today we see practically the whole fuselage and don't think a thing about it. It all comes under the head of progress, whether forward, backward or sideways.

I read that clipping in an old album loaned to me by William Bouldin 3rd, who is the second from the left in the group standing in front of the Wright, taken at Nassau Field in April, 1912. He became interested in aviation at the Belmont Track meet in 1910 and was an active member of the old Aeronautical Society and the Aero Club of America. He learned to fly on a Wright Model B and received his F. A. I. certificate No. 157 in August, 1912, at Mineola, and flew as a sportsman during 1913 and '14. He qualified at Newport News under Captain Thomas Scott Baldwin in the high-powered Curtiss J.N. in September, 1916, and joined the Navy Aviation Corps in 1918, helping it along until 1922, when he left it flat and returned to Wall Street. He is either a bull or a bear—or possibly a lamb. But he has always been in Wall Street and is very, very thin. So I take it that he must be one of the undernourished lambs I hear about. Anyhow, he's pretty smart for an old pilot, for he at least knew enough to go where they have money, whether he managed to get any of it or not. There's some of mine down there that he's welcome to if he can pry it out of the market, where it sunk without a trace last October.

Mr. Bouldin commanded A Company of the First Aero Squadron of the Aerial Militia formed in October, 1913. Major Beckwith Havens commanded the Squadron and Captain Grover C. Loening was technical officer. Other old-timers in that outfit were F. D. Gallatin, G. P. Montgomery, F. T. Coffyn, and J. A. D. McCurdy. McCurdy, by the way, made all the flying experiments for Alexander Graham Bell, the inventor of the telephone and wrong numbers.

(Continued on next page)



Can you identify these old-timers? They are (left to right, standing): Capt. Baldwin, Kimball, Hebard, Andemars, Beatty, Mrs. Beatty, Reid, Bouldin, and Marsh; (seated): Southworth, Williams, Kemper, and Harry Bingham Brown. Photo taken April, 1912, at Nassau Blvd. Field, Long Island

KEYSTONE-LOENING AMPHIBIAN "AIR YACHT"



Keystone-Loening Air Yacht, used by Standard Oil Co. of Louisiana after nearly one year of service during which it was flown over 40,000 miles

RELIABILITY . . . ALL WAYS

UP AND DOWN the Mississippi and over the south-central states that comprise the sales territory of the Standard Oil Company of Louisiana, a de luxe Keystone-Loening Air Yacht swiftly cruises the skyways. Whatever its missions—routine transportation or urgent business—its record is invariably one of accomplishment and abiding good-will.

The utter reliability of this great amphibian has been proven under all conditions encountered. And, during its 400 hours of unfailing service, it has cost *not one cent for repairs!*

Don Dice, Chief Pilot of the Company, says: "Our Keystone-Loening Air Yacht is so stable that its control is never a tiresome task. I have landed it on the rough waters of the Gulf of Mexico, on streams only 80 feet wide, and in small, rough fields. In fact, I have taken our plane, fully loaded, out of smaller fields than I would care to attempt in most commercial planes. In the north or south, in bitter winter weather and tropical heat, its cost of operation has always been consistently low."

Keystone-Loening Amphibians are everywhere demonstrating their splendid qualifications for business and industrial use, as well as for regular passenger transport duty. Full specifications with operating details and costs will be gladly furnished on request. Address Dept. AY- 70

SALES DIVISION

CURTISS-WRIGHT

CORPORATION

27 WEST 57TH STREET, NEW YORK

(PersonAlRlities continued)

THE President of the Washington Glider Club is Edward H. Young, whose interest in gliders dates back to the days of the man-carrying kites. He was born in Washington, November 8, 1883, and at the age of fifteen was associated with Prof. William A. Eddy, from whom he learned the fundamentals of scientific kite-making and flying. Prof. Eddy went to Washington to interest the U. S. Government in aerial photography by the use of kites, but the Government considered that merely a flight of fancy. Mr. Young assisted at these experiments, taking a number of photos at an elevation of 1,100 feet. From 1898 on Mr. Young continued making kites, until in 1904 he was going aloft in twenty-foot kites.

"I studied and tried everything I could lay my hands on," he writes, "and became known by my family and friends as a nut, but still I persisted. By the time the two brothers Wright made their public demonstration of a successful flying machine, I formed the Aero-Scientific Club of Washington, the first aeronautical club ever organized, and was elected its first president. The club grew to a membership of sixty-three and within nine months had built eight flying machines, all of which were more or less successful. In those early days we had to go out and build our machines ourselves, with a hit or miss result. The first airplane built in our club was by Mr. Harry Orme. He brought his machine down to the commons of those days, located where the mirror basin now is in front of the Lincoln Memorial. It was my good fortune to be the pilot on this occasion in September, 1908. We hitched the airplane behind an auto and puled it as a kite on 400 feet of half-inch hemp rope. The airplane rose to an elevation of about sixty feet, and I then glided it down to a nice landing in a distance of about 350 feet, without a hitch. The above flight was the first flight ever made within the boundaries of the District of Columbia, and accordingly I claim to be the first native Washingtonian to have made an airplane flight. I might add that all of us fellows tried our machines out in test flights first by hauling them as gliders behind autos."

E. H. (Eddie) Holterman, now a captain in the Air Corps Reserve, first got in the air by accident, as follows: "My first solo—if it can be called such—was made about Labor Day in 1916 at Midland Beach, S. I. It was nothing but a straight hop of a short distance in an old Curtiss Pusher. In fact, it was an accident and happened while the instructor, Elmer Straub, right hand man of Tom Benoist, was away. They had driven a nail in the longeron to prevent the throttle opening too far while I was 'grass cutting' and learning to taxi, and to prevent the plane taking the air. That day the nail or throttle bent, so I was off before I knew it! Fortunately the field was open and I cut the switch. Completed my training under Roger Janus in the winter of 1916-17, and enlisted at Key West, Fla., in January 1917 in the Signal Enlisted Reserve Corps."



Eddie Holterman on a Curtiss pusher

Holterman instructed at Hazelhurst Field and was chief test pilot at Kelly during the war. In 1923 he took the engineering course at McCook and in 1927 was on active duty for six months at Langley Field, and for another six months in 1928 as assistant engineering officer with 49th Bombardment Squadron. He holds the old Aero Club Expert Pilot's License No. 91, and Department of Commerce Transport License No. 1,354 and is still actively flying, mostly in Army ships.

BECKWITH HAVENS, now vice president and treasurer of Airships, Incorporated, Hammondsport, N. Y., had his first job in aviation, then called aeronautics, with Glenn H. Curtiss as airplane salesman. In 1910 he had charge of the Curtiss exhibit in the first aircraft show, the exhibit consisting mainly of the plane that Curtiss had flown down the Hudson River for a prize of $10,000. In the spring of 1911 Becky Havens joined the Curtiss exhibition team, of which he says:



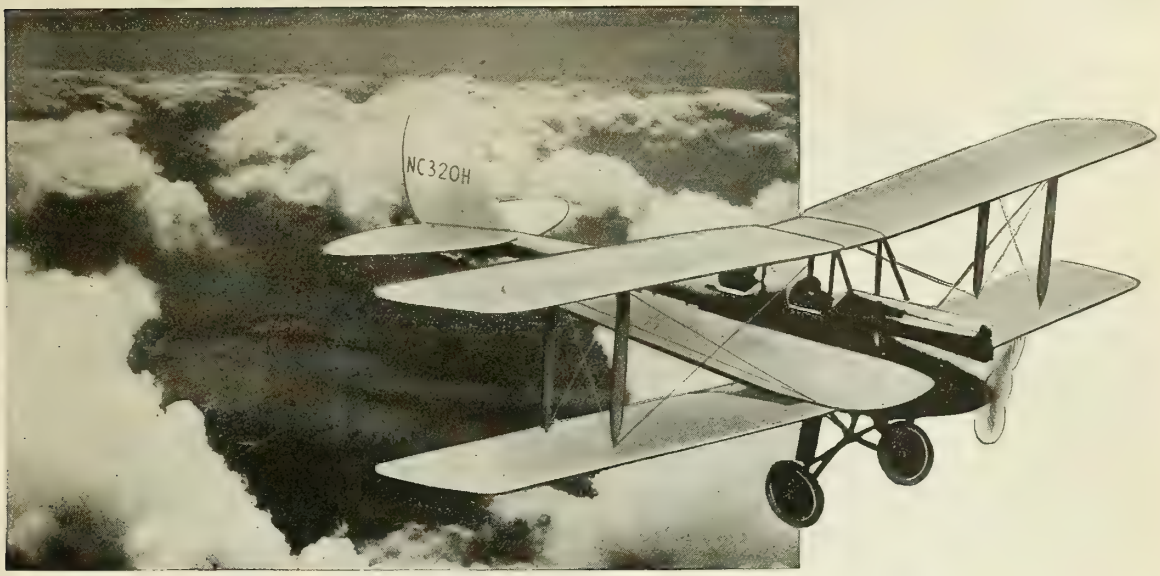
Beckwith Havens

"I hear a good deal about the poor old poverty-stricken days of early aviation. It's the bunk. The rates for the Curtiss exhibition team for one flier were from $500 to $1,500 per day, contracts calling for two fifteen-minute flights or three ten-minute flights. A ball park or half the infield of a race track was considered an airport. We lost a man a month during one season, but if we lived we made money, and liquor was not only better but cheaper in those days. I started with the team at twenty-five per cent of the contract and ended up at fifty per cent. Figure it out for yourself. It's a question whether I or Earle Ovington carried the first air mail. I was with the Curtiss team three years.

"In 1913, Percy Noel organized a grand steeple chase for hydroplanes, as we called them in those days, from Chicago to Detroit, following the Great Lakes. The night before the start we had a grand banquet, and good old Tony Janus and a few others got up and told how good they were. I was too young or too something to make a speech, but with the help of a lot of the finest luck I ever had before or since, we managed to survive the storms and were the only plane to arrive in Detroit, therefore winning all the prizes, except a huge cup which was the principal prize and was being donated by Percy Noel and *Aero & Hydro*. This cup I haven't seen yet. We were so excited by all this success that we continued on to New York with this flying boat, which I think was the third one ever built. This made quite a jaunt for those days, so the Aero Club of America gave me their Medal of Merit and Glenn Curtiss gave me a special gold medal of his own. After that, not much except traveling around the world, then test piloting for the Navy during the war, for which they finally gave me two and a half stripes, then the Curtiss agency for New York State, with Jack Davis in 1920. Then sales manager for Loening, making first transcontinental flight of an amphibion, and now Airships, Inc., which brings us pretty well up to date. I am still in aviation and you would be surprised on some days how active I am. Just because I am an Early Bird doesn't necessarily mean that I am an old bird."

Still, he has reached an age when he isn't exactly boasting about how young he is, for he carefully neglected to mention when he was born. One gets that way as the years pile up, I notice. However, I'll let the world into the secret—he was born on May 29, 1890, which is a long, long time ago. I'm practically a youth compared to him—I wasn't born until 1892.

R. J. ARMOR, sales manager of the Houston, Texas, branch of Curtiss-Wright Flying Service, got his start in aviation in 1909 from the top of the Singer Building, New York. If they hadn't built the Singer Building, Armor might never have flown. But he happened to be standing on the top balcony of that building back in 1909 when Orville and Wilbur Wright flew up the Hudson River. This demonstration so stirred him that he went to Dayton in 1911 and took a course of flying instruction under Frank Coffyn and Cliff Turpin, later becoming a member of the St. Louis Aero Club and the Aero Club of Illinois. He entered the World War, or that part of it being fought in the Massachusetts Institute of Technology ground course at Boston, but the war died out before he could finish and get across. This doubtless saved his life and allowed him to go to the more peaceful front at Pensacola, Florida, where he flew around for a while, and then left flying for the automobile business. He might still have been in the auto business, only flying occasionally for pleasure, but with the definite flying activities that started in Texas he decided that he'd better get back in the business, as some of the boys were eating quite regularly; so he took a refresher course with Texas Air Transport, found the stick would still move where he pushed it, and is back in the game.



ONCE SKEPTICS . . . . . NOW . . . . . FAST FRIENDS with the D. H. MOTH



THEY took the trim lines of the Moth for lightness. They thought that small garage-size planes belonged in army maneuvers. Good pilots and stern critics they were — but they had never flown the Moth. To acquaint them with the facts, Earl R. Southee, manager of the Curtiss-Wright air-base at Columbia, S. C., who flies a Moth by preference, took a 3000-mile, one-man good-will tour.

The tour through six middle-western states, with stops at many airports, was packed with experience that only a Moth and its pilot can meet with tranquility. Line squalls, rain and fog were met and disregarded. Nightfall and unpromising ground brought about a landing in a tiny field and—with wing-slots functioning perfectly—a thirty-foot roll to a stop. Over Cleveland, lack of fuel caused another forced landing in a school yard. But, as Southee comments, "Why worry about fuel when you can land a Moth on a dime and take off from the same dime?"



Earl R. Southee, famous pilot, flys the Moth—by preference

At every airport, well-known pilots were given an opportunity to fly the Moth. Doubtful regard became unqualified enthusiasm, five-minute hops lengthened to half-hour flights —just from sheer joy of handling the Moth. Its performance was praised again and again. The Moth made fast friends with all who laid hands on its controls.

For training schools, the Moth is ideal. It has lightship maneuverability with heavy-ship sturdiness. Its Handley-Page slotted wings make it practically impossible to spin. Its DeHaviland harmonized control surfaces give instant response. Its heavy undercarriage absorbs the hardest shocks of student landings. These qualities together with amazingly low-operating cost make the Moth, Wright Gipsy powered, the choice of leading flying schools.

Full details of the Moth and its performance are yours for the asking. Address, Dept. M-70

Sales Division

CURTISS-WRIGHT CORPORATION

27 West 57th Street, New York

D.H. Gipsy MOTH

AIRPORT AND AIRWAY

News of airlines, airports, and airways; radio, lighting and other auxiliary services

By

Kent Sagendorph

Colonial Rivals London-Paris Line

THE best way to give an American airline official apoplexy is to tell him about the wonderful traffic records on the Imperial Airways London-Paris route. For seven years this line has been the bait dangled before the eyes of adolescent American air transport industry, and the one unfailing response of a Britisher when American aeronautical achievements are mentioned. It must, in all fairness, be given credit for its great volume of traffic for many years. It has given thousands of persons their first glimpse of the earth from an airplane, acted as a flying laboratory for air transport theories and problems. It has been said there are hundreds of American tourists who have flown in its ships but who would not patronize their own airlines at home.

BUT—an American airline has arisen to challenge it, not only in point of traffic, but in comfort, speed and economy. The first time this claim could be entered for a route of equal length occurred on April 12th, when the Colonial Air Transport line from New York to Boston showed a traffic record for the week of 450 *paid* passengers, which exceeded the grand total of all three divisions of the Imperial Airway lines. Colonial dropped back a few points the next four weeks, but blossomed out the week ending May 10th with another victory, again topping all three Imperial Airways lines: London-Paris-Basle-Zurich; London-Ostend-Brussels and London-Egypt-India.

To understand the significance of these circumstances as applied to the air transport industry, we must compare the two lines briefly and note their operating policies. First, the distances are about the same. It is approximately as far from London to Paris as it is from New York to Boston. The Imperial Airways, Ltd., is in reality a government project; closely allied with the Royal Air Force and heavily subsidized by the Royal treasury. The London-Paris line was its first and, from the beginning, was the most successful single route in Europe from a traffic standpoint. It is now running four trips a day in each direction, using Handley-Page eighteen-passenger trimotored biplanes. Each carries two pilots, radio operator and steward.

Time in the air is two hours and a half; fare varies from $20.75 to $28.75 depending on the time of the journey. It's cheaper in the morning and grows more expensive in the afternoon, thus putting a premium on the habit of early rising. The same motor coach system is used there as here, taking the passengers from downtown terminals to the airports. Excellent food and a cold bottle or two may be had during the trip, at regular dining car rates. The Radio equipment has been in use for more than two years. The result is that the Imperial Airways ships can get through rather severe weather.

The Colonial line charges $17.43 all day long for a trip of the same length and makes it in an hour and forty-five minutes. These two advantages are about the only ones visible, however, because Colonial is using ten-passenger Fords that inaugurated the line, and frequently turning away passengers because of lack of bigger planes. Imperial Airways has a fleet of forty-passenger, four-motored Handley-Pages built, tested and ready for the summer rush of American tourists who believe that American airlines aren't safe. In the three months of June, July and August, Imperial Airways carries about fifty per cent of its whole annual traffic. A great part of it is the tourist trade. Americans return and tell you about the wonderful London-Paris line, and how superior it is to the American lines, (on which they have usually never ridden) and casually remark that they always travel by air "on the other side," but that the home airlines are "still in a period of development, you know." Thus, Imperial has catered to this fallacy by equipping these new forty-passenger jobs with every possible luxury. The interiors look like a corner in Buckingham Palace.

In the main, Colonial carries business men, salesmen, and practical people who want to go to Boston in a hurry. Imperial carries persons of wealth, leisure and importance who don't like the stormy boat trip across the channel, and American tourists who like to say that they flew on it.

The Colonial line is working against heavy odds and making a pretty good showing. It has risen to the present position of leadership without a government subsidy, with no government shops to test and experiment new equipment. American Airways, Inc., operated at a loss last year on its other lines, and Colonial, a money-maker, has had to bolster up the other subsidiaries. With these obstacles in its path, it has gone ahead steadily, carrying more and more passengers and charging less and less. It is only a question of time before American Airways will be forced to provide new and larger carriers, and then Colonial can truly make its bow to the world as the first American airline to challenge the supremacy of the government-assisted Imperial Airways, Ltd., over a route of equal length.

Apologies to Mr. Henry DuPont

TO Mr. Henry DuPont, prominent citizen of Wilmington, Delaware, the apologies of this section are sincerely extended. Last month we told our readers that there was a new private airport near Wilmington belonging to Belin DuPont, equipped with two hangars, beacons, weather observation station and other modern conveniences, and that it was strictly a DuPont company venture, not open to the public.

It was in the nature of a shock, therefore,

(*Continued on next page*)



Architect's sketch, prepared by B. Russell Shaw, showing the proposed terminal building at Detroit-Wayne Airport



Modern air depot at the United Airport of the Boeing System at Burbank, California . . . one unit of the complete airport recently designed, built and equipped by Austin

MAKING EARTH AS SAFE AS AIR

STRANGE though it may seem, there has often been more safety in the air than on the ground . . . for airports from Coast to Coast, almost without exception, are still struggling with landing areas as unsatisfactory for ships as the rutted road was for the early automobile.

Knowing that the profit-making future of aviation depends largely on ground development, The Austin Company, airport engineers and builders, have specialized in every phase of this work . . . . from preliminary survey, report and site selection to the complete engineering and construction of airports, including grading, drainage, lighting, runways, air depot, flying schools and hangars. Design and construction of aircraft and accessory manufacturing plants has also been an important part of Austin activity. Aviation projects in 22 states and 38 cities have been handled by Austin Engineers.

Among the things that are being given major attention are the creation of better accommodations for passengers. Modern depots with up-to-date conveniences must be erected at the leading airports. Smooth runways and proper landing areas must replace the obsolete landing fields which threaten the transport pilots from a safety standpoint, and disgust passengers. Today, with larger ships and definite operating schedules, hangars that provide up-to-the-minute repair and servicing facilities, comparable in efficiency to those now in use in other fields of transportation, are being needed in increasing numbers.

To every executive interested in aeronautical development . . . . whether it be design, construction and equipment of a complete port, hangars, depot buildings, or manufacturing plants . . . . Austin offers an intensely interesting booklet entitled "Airports and Aviation Buildings", in which, among other things, the relative advantages, disadvantages and costs of various types of landing areas are discussed. Wire, phone, write or use the convenient memo below for the booklet, as well as approximate costs and additional information on any project contemplated.

THE AUSTIN COMPANY

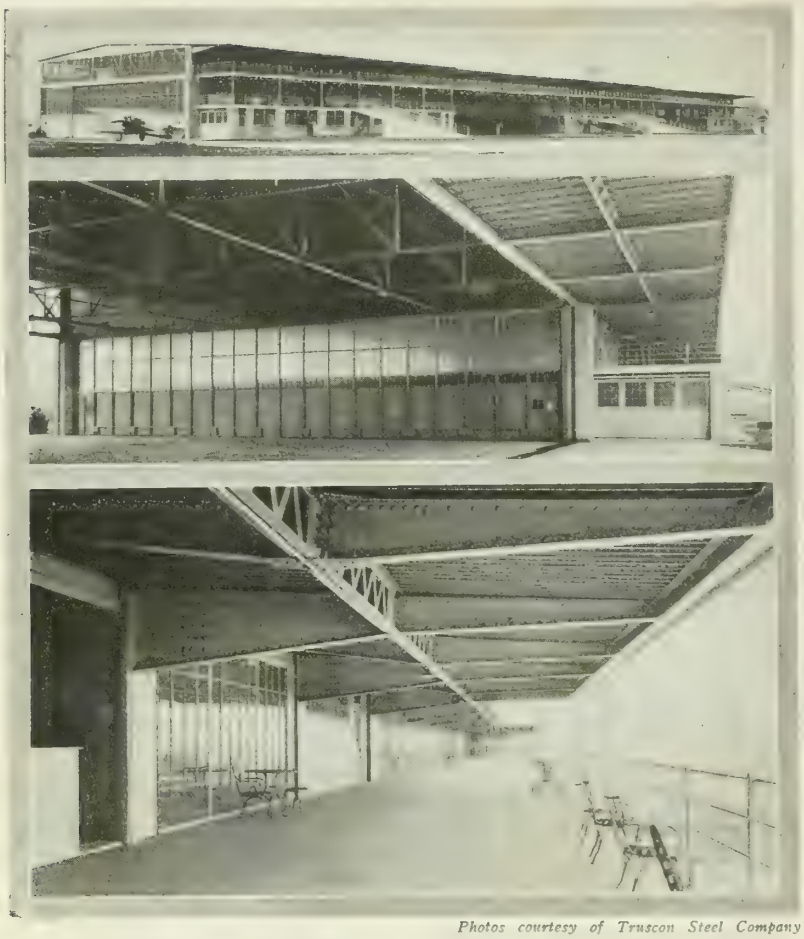
THE AUSTIN METHOD

Airport Engineers and Builders Cleveland

New York Chicago Philadelphia Newark Detroit Cincinnati Pittsburgh St. Louis Seattle
Portland Phoenix The Austin Company of California Ltd.: Los Angeles, Oakland and San Francisco
The Austin Company of Texas: Dallas The Austin Company of Canada, Limited

USE THE AIR SERVICE

Memo to The Austin Company, Cleveland—We are interested in ☐ Airport (Municipal) (Private) containing ..... acres. ☐ Hangar..... x.....
with..... ft. clearance. ☐ Factory approx..... sq. ft. Send copy of "Airports and Aviation Buildings." Name.....
Position..... Firm..... City..... AD 6-30



Photos courtesy of Truscon Steel Company

Views of the Curtiss-Wright hangar at Glenview, Ill., showing complete building, and closeups of the hangar doors and observation deck

(Continued from preceding page)

to receive a cordial letter from Mr. Henry DuPont saying that the airport was his, not Belin's, and that it was not a company airport at all—anyone who happened to be in the vicinity was at liberty to land there, and that accommodations for transients had been provided. Furthermore, Mr. DuPont extends a welcome to any pilot who is flying in the vicinity and seeks a well-equipped airport for overnight storage or service.

Fresno's Strange Airport Rules

AFTER a discussion in this section two months ago concerning an airport which had a fee for everything using a screw-driver to turning on a light in a hangar, it is with genuine enthusiasm that we write of the new Fresno-Chandler Municipal Airport, Fresno, California.

Fresno is about half-way between Los Angeles and San Francisco, for which reason this strategic location is likely to become an important stopping place for private owners and passenger airliners. It has built a new airport of 100 acres, not two miles from the city hall, and from the photograph sent me, it appears to be within walking distance of everything in town. Three hangars have been erected on the property, and an oiled and graded runway 3,000 feet long by 400 feet wide runs diagonally from northwest to southeast. The usual white circles mark the runways and landing areas.

Licensed mechanics are on duty. Service and supplies of all kinds are available, and a well-equipped restaurant is located conveniently nearby.

If any but a licensed pilot lands there, notice is hereby given that he will be pinched. The sheriff also has a truck wherewith to cart unlicensed airplanes off the field. Student pilots may land, but they must not fly over the city of Fresno. They must show a white streamer on each wing-tip to warn other pilots in the neighborhood to give them plenty of room.

But the fees! Ohio Pilots please notice: for turning on the floodlight for a night landing for a period of thirty minutes or less —nothing. For storing a plane of any size overnight—fifty cents. For leasing ground to build a hangar—thirty-five cents per front foot per month. You may even establish a filling station on the field and sell gasoline for ten dollars a month, plus a small tax on the fuel sold.

This sounds like a pilot's paradise, but they take their revenge on the barnstormers. Planes "other than those belonging to lessees of space at the airport, carrying passengers for hire" are assessed a dollar a flight, plus fifty cents for each passenger carried.

It looks as if Fresno were trying to show the Easteners what the well-known "Western hospitality" is like. Compare these fees with those of the airport mentioned: $2.00 per hour or fraction thereof for the use of the floodlights, $40.00 a day to operate a seven-passenger sightseeing plane, whether it carries any passengers or not; other fees for things like the use of tools, occupying a cot overnight, use of a locker, etc. Storage of planes overnight is charged according to size, varying from $2.50 to $5.00 per day. It costs twenty-five cents to turn on a light in a hangar on that airport.

Strip Maps Save Your Temper

SET the stabilizer, and take your hand off the stick. Then reach for a thin paper road map, and unfold it until it reaches its full size of about thirty inches square. Holding it firmly between your fists, try and locate your position on it. In an open cockpit job the wind will save you the effort, by taking the map and depositing it in the adjoining county. In a cabin job, there is often no room to unfold it and hold it open; you must fold it every few minutes to uncover a new section of your pencil line running to the destination.

In doing so you lose the railroad, or whatever it was you were following, and there is no roof marker in sight. You wonder if there is a field nearby. You don't know the compass variation in this locality, and you cannot fly by uncorrected compass over unfamiliar territory. The map says you ought to be somewhere near Dingleberry by now. Maybe that town over there is Dingleberry—or is it Rubeville? Why doesn't the map tell you? The clock says you ought to be 200 miles away from your starting point. If you could find a marker, you'd know where you were. The map says to turn left at Rubeville on State Highway No. 9. That's a laugh. If you could only find your position on that road map—but all the towns look alike; just a round dot on the map.

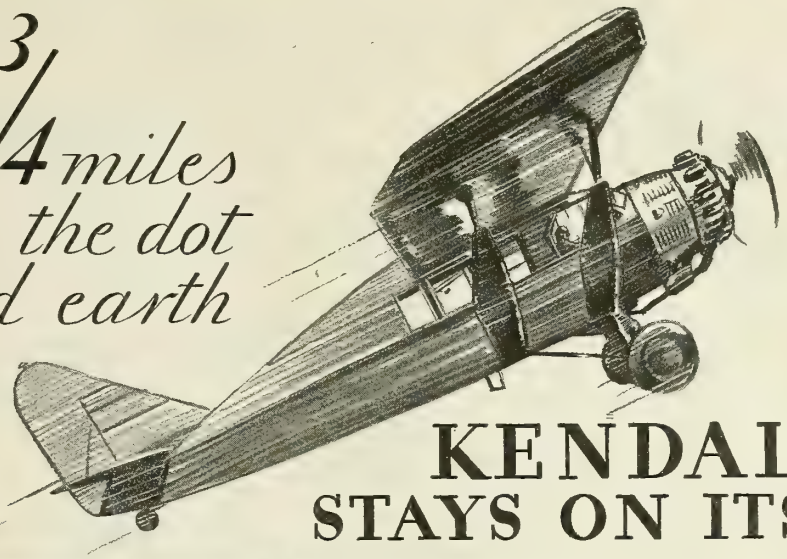
When you are flying over unfamiliar territory, the more information you have the more comfortable you are. Old-timers who have been flying since 1911 will tell you that they can get anywhere with a New York Central timetable; one of them told me he could fly from Montreal to Vancouver on a Canada Dry label. Younger pilots listen with open mouths and think they are some species of super-being. Sensible pilots with a great deal of cross-country flying get a strip map, or make one by taking a state map and adding as much information as they can find, in ink, and fitting the strip in a map holder. For journeys across two or more States, they cut the State maps into strips and paste them together.

The most complete strip maps I, personally, have ever seen are the ones published by the Hydrographic Office, Navy Department. Unfortunately they confine their strips to coastwise routes, but in any case where they can be used they will surprise the most experienced pilot. They cost forty cents each, and anyone may procure them by writing to the above office in Washington.

They have, of course, all the different

(Continued on next page)

5 3/4 miles above the dot called earth



KENDALL STAYS ON ITS JOB



CLIMBING, climbing . . . up through the cold and lonely air . . . up where few eyes have ever scanned the empty horizon, a solitary plane mounted to new heights, set a new record for commercial aircraft. Pilot, plane and engine fought each foot of the way across the vault of the upper skies—against cold, against thinning atmosphere and the pull of gravity. Much depended on correct lubrication. But Kendall Oil was the engine's protection and the pilot's ally. All was well!

George Haldeman, master pilot, guided the course of his powerful Bellanca cabin monoplane. It was 50 degrees on the ground when the cold motor roared into life—it was more than 30 degrees below zero when Haldeman reached the top of his climb—a drop in temperature of 80 degrees. But all that time, Kendall Oil kept feeding those stalwart metal arms of the 300 H. P. Wright Whirlwind with perfect unvarying lubrication. Kendall Oil flowed easily even at the maximum altitude. "I used Kendall G," said this renowned flyer, "and with your lubricant the motor functioned perfectly throughout the flight."

The Bradford grade of Pennsylvania crude is the only source of Kendall Oil. No other crude and no chemicals go into its refining. The most modern methods known to the industry are maintained. This high-grade product is guarded from impurities, wax or harmful agencies by expert chemists and refining engineers. Every gallon of Kendall is just like every other gallon . . . pure, reliable, outstanding in performance.

Other records made by George Haldeman —Using Kendall Oil

Canada to Cuba Flight, Feb. 23rd, 1929

First in Detroit News Speed and Efficiency Contest, Sept. 1929

First in Cleveland to Buffalo Efficiency Race, Sept. 1929

First in 5th Annual Ford Reliability Tour—Oct. 1929 with single engine cabin plane

BUY AT THIS SIGN PENZBEST KENDALL MOTOR OILS IT IS YOUR PROTECTION

For a list of airports where Kendall may be obtained, and complete information about this remarkable all-Pennsylvania lubricating oil, address: Kendall Refining Company, Bradford, Pennsylvania.

KENDALL OIL

REFINED FROM 100% BRADFORD GRADE OF PENNSYLVANIA CRUDE

(Continued from preceding page)
routes between these points drawn in with red dot-and-dash lines; list of airports and intermediate fields and the other information seen on a State air trails map. But in addition, these maps have all the navigation done for you—they give compass bearings in degrees in both directions, magnetic variation at both ends of the line, location of all radio weather stations, code beacons, flash beacons, lighthouses and every other sort of a light you might wonder about on a night flight. They show outlines of towns to scale in their proper shape, so that you can identify them. Towns with roof signs are underlined in red ink. Obstructions, such as high-tension lines, chimneys and so forth, are given, together with their height. By counting the number of red dashes in the line in the map, you know how many miles you have traveled.

On the reverse side is a string of oblique aerial photographs of every airport and landing field along the route, and full description of each. Seaplane anchorages are treated the same way, with soundings in fathoms, fuel supply and tidal information given.

With such an encyclopedia of information, it is almost an impossibility to lose your position as long as you can see the ground at all. These maps are printed in colors on a strip of medium weight cardboard ten inches wide and about three inches long, to slip in a map holder. By turning the handle, you expose a few inches of the map at a time and can check your position constantly, not every ten minutes or so when you fold a State road map.

The Hydrographic Office, Navy Department, will furnish a complete list of the routes covered by these maps upon request.

Coöperation Between Transport Lines

THROUGH the efforts of the American Air Transport Association, a plan has been made for exchange of passengers and interlocking schedules by all the companies which hold membership in the associated; about ninety per cent of the firms in the industry. This idea is now being submitted to the various companies for approval, and it is hoped that all the members will coöperate with the association in the handling of through traffic which involves two or more airlines.

By this plan each line would honor standard through tickets issued by the association. These would be good on every airline in the country which approves the plan, and would allow the passenger to buy a ticket at his point of departure for a complete trip to his destination. Up to the present, the airlines have sold tickets on their own lines only, which is a considerable handicap to passengers on a long trip involving changes to other lines.

The plan is certain to increase the traffic on airlines as a whole, and might result in local increases on small lines which join the great transcontinental systems at division points. The chief obstacle is that by this plan each ticket agent becomes a representative of all the airlines in the country, and many of them have as yet insufficient knowledge of the whole situation to give a prospective passenger accurate information. If these obstacles do not prove insurmountable, however, passengers should be able to buy a ticket in Boston, for instance, for an all-air trip to Dallas, by way of Colonial, N. A. T., (when it starts carrying passengers) Universal and S. A. F. E.

AIRPORT AND AIRWAY DEVELOPMENTS

Revised List of Airports Ready

THE Aeronautics Branch, Department of Commerce, has issued a new edition of Aeronautics Bulletin No. 5, a list of airports and landing fields throughout the country. Revised to April 1st, 1930, the new bulletin gives a complete list, by States, of all municipal, military, private and commercial airports, landing fields and intermediate fields.

Copies may be obtained by writing Col. Harry H. Blee, chief of the Bureau of Airways and Aeronautical Information, Aeronautics Branch, Department of Commerce, Washington. No charge is made for the bulletin.

Notices to Pilots

RESTRICTED AREAS: No civil aircraft is to fly above the following places under any conditions, unless by specific authority from the military or naval authorities of the district mentioned:

Tortugas, Fla.; Great Harbor, Culebra, Panama; Guantanamo Naval Station, Cuba; Pearl Harbor, Hawaii; Guam (entire island); Subig Bay, Philippine Islands, and Kiska, Aleutian Islands.

Airport Discontinued: Whittall Field, located about five miles east of Worcester, Mass.; formerly operated by Curtiss Flying Service. It is to be available for emergency landings but will have no facilities.

Radio Beacon Established: Cape Cod Light Station, Mass. Transmits a group of two dashes and one dot for sixty seconds, silent 120 seconds. Frequency of 305 kilocycles continuously during thick or foggy weather. Position: 42-02; 70-04.

New Beacon: 50,000,000-candlepower light on the Bendix Building, Los Angeles, Calif. It has an 8,000,000-candlepower auxiliary beacon pointing to Grand Central Air Terminal, and a red neon "B" to identify it.

Fields In Poor Condition or Under Construction: Dunkirk, N. Y. Very soft, and water standing in places. Pilots are warned to exercise caution in landing.

Lebanon, Ohio. Work under way to clear out tile and fill in some washed-out places. Unsafe spots marked by flags by day and lights by night.

Monroe, Mich. Filling and grading work going on. Boundary lights have been turned off on the northeast edge, and temporary red lights put up.

Miller Field. New Dorp, Staten Island. Construction work in progress, and pilots should use the south half of the field only.

El Paso, Texas. The pole line to the west of the municipal airport is not obstruction lighted, although shown as such in the Airport Bulletin. Pilots are requested to note this change on Bulletin No. 551.

Woodburn, Oregon. Intermediate field is soft in the southeast corner. Remainder of the field is suitable for small planes only. Any job weighing over 2,000 pounds should not land there at this time.

Cottage Grove, Oregon. Stay on the runways. Rest of field poor.

Sharon, Pa., American Eagle Airport, covered by Aeronautics Bulletin 443, has been plowed up and will not be used for further aeronautical activities.

Two New Airports Ready: Muskogee, Oklahoma, Hatbox Field, known for many years as the pioneer field in Oklahoma, now converted to a municipal airport. Dedicated May 26th by Secretary of War Hurley.

Hutchinson, Kansas. New municipal airport one mile east of town on U. S. Highway 50; 260 acres, one new hangar, gas, oil and service. To be dedicated on June 6th.

Seaboard Aircraft Takes New Roosevelt Field Hangar

SEABOARD Aircraft Corporation, of which Arthur K. Ranson is general manager, has leased hangar D, the fourth new hangar at Roosevelt Field. The firm, in addition to being the distributor for Detroit Aircraft Corp. (Ryan, Lockheed, Eastman Flying Boats, etc.) and Mohawk planes, offers a complete service to transients and private owners; overnight or by the month. Col. Lindbergh's Lockheed Sirius was quartered there after his return from Miami

Plans for 900 More Miles of Airways

FEDERAL expenditures on airways during the year beginning July 1st will amount to $7,944,000, as estimated by the Aeronautics Branch, Department of Commerce, and will provide another 900 miles of airways with lights and other navigation facilities. In addition to this new mileage, 3,000 miles of existing airways will be provided with beacons.

Most of this new lighting will be installed on the southern transcontinental routes, in the vicinity of Atlanta, Fort Worth, El Paso and Dallas. The Dallas-Louisville route is to be lighted, as well as the Jackson-Richmond airway. It is hoped that these lights will help the pilots on the South American airlines which take off from Florida, and the lines leading into the Florida terminals of those lines.

When this installation is completed, there will be 17,500 miles of airways equipped with night-flying lights, and sixty-five radio stations to provide weather information to pilots flying over them. This just about fills all the gaps in the radio map—there will be hardly a mile of organized airways not served by beacon lights and radio weather service.

Fokker Aids Roof-Sign Movement

PASSENGERS on the New York-Boston route of Colonial Air Transport looked with interest, recently, at a new air sign on the roof of the Teaneck Coal and Lumber

(Continued on next page)

Murphy Non-Toxic Nitrate Dope

gives you these definite advantages

1. Absolute safety for workmen
2. Greater tautness and filling with less consumption of material
3. Considerably less weight on plane

THESE three important points of superiority of the new Non-Toxic Nitrate Dope, perfected by the Murphy Varnish Company, are of the utmost interest to every man concerned with the manufacture or maintenance of airplanes.

Whatever you may be using now, you owe it to yourself to learn the full facts about this remarkable material. Read the three points again. They are not claims, but promises, with the name Murphy behind them.

We shall be pleased to send you complete information on Murphy Non-Toxic Nitrate Dope or to give you a demonstration.

MURPHY VARNISH COMPANY, *Newark · Chicago · San Francisco*



MURPHY FINE FINISHES

Famous for 65 years among architects, master painters, and makers of products requiring a fine finish

Aircraft Spraying Lacquer Colored
"Z-1" Dural Primer Enamel
Aircraft Flexible Finishing Lacquer Clear
Aircraft Super Spar Varnish
Heat Resisting Aluminum Mixing
Aircraft Non-Toxic Nitrate Dope

The Coupon is for your convenience

MURPHY VARNISH COMPANY
Newark, N. J.

☐ Please send further information on Murphy Non-Toxic Nitrate Dope.
☐ I would like to arrange for a demonstration.
☐ Send "Specification Manual for Aircraft"

Name_____

Address_____

City_____

(*Continued from preceding page*)

Co., Teaneck, N. J. It is one of the largest signs in the vicinity, but its chief claim to fame is that it is illuminated each evening by a battery of twenty-four large 200-watt reflector lights, so that the odd name "Teaneck" penetrates the darkness to altitudes of several thousand feet.

It has two arrows; one pointing north and the other pointing toward Teterboro, the nearest airport.

It was erected by the town of Teaneck, aided by the Fokker Aircraft Corporation of Hasbrouck Heights. The Fokker company is assisting other communities nearby to place signs on suitable buildings in accordance with the request of the Department of Commerce.

How Should Obstructions Be Marked?

THERE is a right way and a wrong way to place a marker on an obstruction to air navigation, we are informed by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The wrong way is a useless waste of time, because there is a uniform code for marking these obstacles, and it should be followed wherever such conditions appear.

By writing to the Aeronautics Branch of Commerce, a bulletin called "Instructions for Marking Obstructions to Air Navigation" will be sent upon request.

Structures such as radio towers, smokestacks, transmission lines, and so forth, should be correctly marked by the proprety owners.

Two Items From San Francisco Bay

RESIDENTS of San Francisco and Oakland are watching with keen interest two different kinds of airports which are being constructed simultaneously in the bay and on its edge. One is the so-called "Button Airport" of Air Ferries, Ltd., now in service at the San Francisco end of the "shortest airline in the world."

It was named Button because it looks like a button, is built like a button, acts like a button. It is built on the "seadrome" principle; rigid columns on submerged floats supporting an elevated platform. But in this case the platform is circular in shape and has a rounded surface; hence the button designation.

When the Loening amphibions alight on the bay nearby, they extend their wheels and taxi up on the rounded surface under their own power. They approach from any direction without the necessity of landing crews and delays in approach due to winds and tides. When ready to take off, the plane simply rolls down the other side of the rounded surface and scuds across the bay like a duck on a pond.

More than eighty-five landings are made on it daily by the five planes of the line, and it shows signs of being a complete success. It is ninety-seven and a half feet in diameter, with a pontoon on the stern and an overhanging platform. The pontoon is divided for water ballast to regulate trim and depth. The surface is a variable curve to break rough water and to give the maximum freeboard. It was built at the C. L. Arques Shipyard in Sausalito at a cost of $10,000. Patents are pending covering the major principles.

On the Alameda side of the bay, 7,000 cubic yards of new ground are appearing every day. The engineers in charge of building the new Curtiss-Wright airport are dredging that amount of sand daily from the Oakland-Alameda estuary and piping it to the scene of the new airport. Because of the speed of construction, the area of the airport has more than doubled in the last three months.

This project, when completed, will provide the airport with a total of 360 acres, and three runways ranging from 3,000 to 4,000 feet in length. Bids have already been received for the projected yacht harbor and seaplane base which is to adjoin the property, entailing a total expenditure of $150,000. The airport alone will require a sum of $2,500,000 to construct.

It is already in use by T. A. T.-Maddux as its San Francisco terminus, with two arrivals and departures daily. About forty airplanes are quartered there at present, including training planes for two flying clubs. By using the Air Ferries, Ltd., patrons may reach the field from either San Francisco or Oakland in about ten minutes.

NEW COMPANIES AND MERGERS

Robertson New Orleans-St. Louis Passenger Service

TO veteran pilots of the pre-Lindbergh era, the name Robertson is as well-known as the name Boeing today. It was the Robertson Aircraft Corporation that first carried air mail on the St. Louis-Chicago run; it was the same Robertson that employed one Charles A. Lindbergh as chief pilot on that line. It was to Major "Bill" Robertson that he came with plans for his trans-Atlantic flight, and this discussion resulted in enlisting the support of Harold Bixby, Harry H. Knight and the other backers of the flight.

The original Robertson Aircraft Corporation is now a unit of Universal Air Lines. But Major "Bill" and Brother Frank have organized and launched a daily passenger service between St. Louis, Memphis, Jackson, Miss., and New Orleans, under their new corporate name—The Robertson Airplane Service Company, of St Louis.

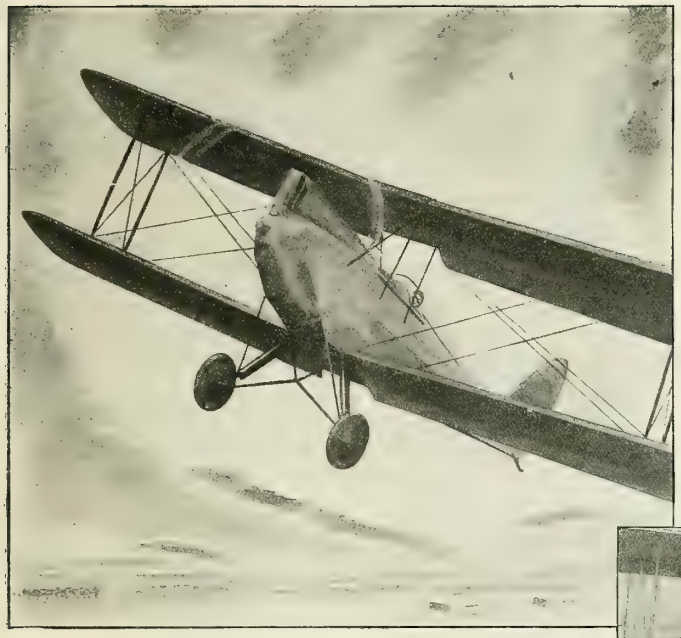
The group is headed by Frank H. Robert-

(*Continued on next page*)



Roosevelt Field, Long Island, N. Y., as seen from the air. Line of new hangars in the foreground

ORGANIZE A FLYING CLUB



supervised by

CURTISS-WRIGHT

SOLO FLYING $6.57 per hour



THE Curtiss-Wright Flying Club Plan offers you an opportunity to fly—conveniently and at very small expense. You are not required to serve in a military or commercial air organization to obtain a private pilot's license. For a very small sum you may join a Flying Club in your vicinity. If there is none, you can get together a few friends and form one.

Under the Curtiss-Wright Flying Club Plan it is possible to reduce the cost of dual instruction to as little as $11.57 per hour. After the necessary dual instruction, solo flying can be carried on at the rate of $6.57 per hour.

The Curtiss-Wright Plan presents an opportunity for war-time pilots who would like to resume flying. They can quickly obtain a pilot's license and use the club plane at a very low cost per hour for pleasure and sport—or to build up time for a commercial pilot's license and then continue on and obtain a transport pilot's license.

When your training is supervised by the Curtiss-Wright Flying Club Plan, you are assured of obtaining instruction from a Transport Pilot, either trained by Curtiss-Wright or who has passed the high efficiency tests required by this organization.

A Curtiss-Wright Flying Club may be started by any group of men interested in learning to fly—usually headed by one or two aggressive leaders. Airport and hangar facilities, while advisable, are not absolutely necessary. Any smooth field of adequate dimensions will provide facilities for Flying Club purposes.

Organize a Flying Club. Get into the air! Sell the idea to your friends. Clip and mail the attached coupon for complete information and organization plans.

CURTISS-WRIGHT FLYING CLUB PLAN

Robertson, St. Louis County, Missouri

CURTISS-WRIGHT FLYING CLUB PLAN
Robertson (St. Louis County), Missouri

Gentlemen: Please send me, without cost or obligation, full details and plans for organizing a flying club.

Name .....

Address .....

City ..... State .....

AD-6

(Continued from preceding page)

son, and includes Phil DeC. Ball, Harold Bixby, Maj. William B. Robertson, and Harry H. Knight. Pilots in the new service are such famed veterans as Harlan "Bud" Gurney, Dan Robertson, Richard Happ, Jack McMillan and Joe Read.

The service was started a few weeks ago with single-engined Ryan Broughams, which will be replaced with dual or tri-motored craft as soon as they can be obtained. One trip per day is the present schedule, with departure at 11:00 a.m. from St. Louis, southbound, and from New Orleans at 9:40 a.m., northbound. The fares are: St. Louis to New Orleans, $45; St. Louis to Jackson, $32.50; Memphis to New Orleans, $25. Total distance is about 625 miles.

Beside the significance attached to the name Robertson, this line follows one of the most famed transport routes of the world—the Mississippi River. The airline covers, in six and three quarter hours, the whole distance from St. Louis to New Orleans, which in Mark Twain's time by river boat was a matter of several days. The historic race between the *Natchez* and the *Robert E. Lee* took place over this same route. The winning captain carried no passengers or freight, streamlined his twin smokestacks and reduced "wind resistance" as much as he could, and then took more than three days to make the trip. Vicksburg, now a mile or so from the river, the scene of one of the most serious sieges of the Civil War, passes directly below the planes of the new line. Natchez and Memphis, also on the route, are among the most famous of river ports. The whole route is lined with places of historic interest.

As a passenger line, it shows every promise of success. It is the first daily airline to follow the Mississippi River, and the fact that passengers have traveled this route for over a century gives promise of a substantial airline traffic.

Mason & Dixon Air Lines Re-Opens

ANOTHER airline with a name famous in the South is the Mason & Dixon Air Lines, Inc., of Lunken Airport, Cincinnati. The name, however, is the only Southern feature of the line, which operates northward from Cincinnati via Dayton, Ohio, to Detroit.

Four planes are scheduled daily on the line, which has re-opened its schedule after a lapse during the past winter. Two trips daily are made in each direction. Planes leave Detroit and Cincinnati at 10:40 a.m. and 4:30 p.m. One stop is made at Vandalia Airport, Dayton. Fare between Cincinnati and Detroit is $15.00. Time is two hours and forty minutes. Wasp-powered all-metal Flamingo monoplanes are used on the line.

Varney Carrying Passengers Now

WALTER T. VARNEY, dean of all mail operators, has done about everything in aviation except run a passenger line. In the old days just after the war he had a successful school, and later distributed and sold planes. This feat was then nothing short of miraculous. When the Government turned over the mail lines to private operators, Varney was one of the best-qualified men in the country to operate an air mail line, and his Salt Lake City-Pasco, Washington, route has been successful from the start. Lately he added express to his cargoes, as mentioned a month or two ago in the Airport and Airway section.

Now, however, he believes the time is appropriate to enter the passenger field, and has done so with the usual Varney ceremonies, which include carrying prominent citizens on inaugural good-will trips to other towns on his line, and arranging reception committees to welcome them with flowers, speeches and keys to the city.

This new passenger service is a serious effort, one which should be quickly appreciated by residents of Seattle, Spokane, Portland and other cities in the Northwest. It is a good connecting link with the Boeing transcontinental system at Salt Lake City and has immediate possibilities as a strong feeder line for this transcontinental air system. Heretofore, citizens in the Northwest who wished to go East by air had to take a train to Salt Lake City, or go by airplane to Oakland or San Francisco and by Boeing line from there to Salt Lake. This new Varney line offers two eastbound and two westbound trips daily, flying from Salt Lake to Pasco via Boise, in eight hours, one-fourth of the train time. We have no information as yet about the fares or the type of ships used. In the next issue of AERO DIGEST we hope to be able to furnish more detailed information concerning the line's operation.

The existence of this line makes the Boeing service from Chicago to the Coast apply to all cities on the Pacific slope. Leaving Chicago, the westbound passenger flies to Salt Lake, where he may transfer to Western Air Express planes for Los Angeles, Varney planes for Seattle, Portland and Spokane, or stay on the Boeing plane to San Francisco.

AIR MAIL NOTES

New Model Fleetsters

ADVICES from the Consolidated Aircraft Corporation, Buffalo, N. Y., state that a special model of the Consolidated Fleetster has been developed and the first one built assigned to the New York, Rio and Buenos Aires Line for use with mail and express only.

The new model differs from the previous one (Model 17) in that the passenger compartment has been eliminated and the pilot's seat moved aft. The wings have been raised twelve inches from the fuselage, and carried on short struts. The plane carries a payload of 1,870 pounds of mail or express at a cruising speed of about 150 miles per hour. The plane is powered with a Pratt and Whitney Hornet.

Several have been ordered by the NYRBA Line, after which the model will be available to other mail lines.

Big Increase in April Poundage

FOR the month of April, 1930, the total number of pounds of air mail carried by the various lines jumped 46,043 over the total for March. Total for April was 671,391. Average daily poundage was 25,822.

Boeing still leads the list, having carried 190,521 pounds during the month. N.A.T., with 117,121 pounds on the New York-Chicago route, was second.

Post Office Department Grants New Air Mail Certificates

FIVE certificates were granted by Postmaster General Brown to the operators of the first five air mail routes on the present schedule, at Washington on April 29th. The present contractors remain unchanged, and the routes will not be altered. Instead of collecting so much per pound, the new rates are on a mileage basis, which is given below. The assumption is that nine pounds of mail occupy one cubic foot. The following figures show, first, the basic or regular rate, and following this, the rates for night flying, fog flying and other conditions encountered on certain of the routes:

Boston, via Hartford, to New York:
Colonial ....$ .69 .86½ .88½
Chicago to St. Louis, via Peoria:
Robertson ..$ .59 63½ 63½ .67
Chicago to Dallas, via Fort Worth:
N.A.T. .....$ .80½ .95½
Los Angeles to Salt Lake via Las Vegas:
W.A.E. $1.07½ 1.14½ 1.17 1.17½
Salt Lake to Pasco, Washington:
Varney .....$ .8398

These are rates per mile with mail, and show the variables for other types of flying than normal, daylight operation in fair weather. Varney, for instance, has only one rate, while Western Air Express has four.

These rates will remain in effect until December 31st, after which the Postmaster General may move them up or down.

Information On Air Mail Movements

THE New York Postoffice has compiled an elaborate circular which gives the most recent schedules governing air mail movements out of New York City to any other air mail stop in the United States, Central and South America and the West Indies. It is called "Air Mail Service Information" and copies may be had upon request.

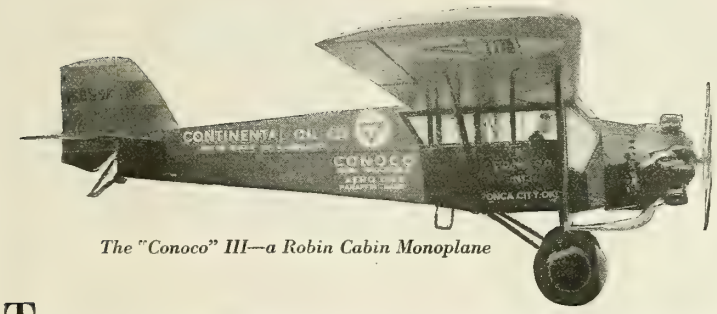
Information is given on the following:

Limit of weight and size, special air mail stamps, etc.; closing time for all air mail routes out of the city, and three pages of closely-packed figures showing when a letter must reach the general postoffice to get away to any air mail stop in the country, and the time of its arrival there. Information is also given about the complex routes in the West Indies, South America, etc., and how many stamps are required. Time of arrival at the various foreign ports is also given.

It makes a good source of reference for anyone who must know when a letter posted in New York at 4:00 p.m. will be delivered

(Continued on next page)

TRAVEL AIR AND ROBIN— PAY THEIR OWN WAY *for* "CONOCO"



The "Conoco" III—a Robin Cabin Monoplane

THE value of Curtiss-Wright planes to business and industry is well illustrated in the service of Continental Oil Company.

"Continental Oil has found that aviation pays its way. It is not a fad or fetish, but an essential adjunct to good business management. Time saved is money saved, and, as a result of airplane travel, Continental Oil Company saved some 15 days of executive time during one month. On several occasions, airplanes have been used to avoid delays that would have meant the loss of thousands of dollars in crude oil and gas, and might have resulted in heavy destruction of property."

Thus does Mr. D. J. Moran, president, describe the service rendered by the Conoco II, a 6-place Travel Air monoplane, and Conoco III, a 3-place Challenger Robin.

During a promotion campaign, the Travel Air carried four company executives on a 5,000-mile tour, making 12 stops for sales meetings. On this one tour, it was estimated that use of the Travel Air represented a saving of $2,000 over any other means of transportation.

The 3-place Robin is assigned to Mr. O. M. Bounds, aviation sales manager, "not as a passenger ship, but to use just as the jobber salesman or dealer salesman uses his automobile." Not only has the Robin proved itself indispensable in covering a large sales territory, but its smart appearance has a decidedly advantageous effect in making aviation sales.

The Conoco planes are constantly used when emergencies demand quick action. They have carried experts from Oklahoma to California to cap a "wild" gas well. A break in a cross-country pipe line, from which gas escaped at a rate of $4,000 daily, was discovered from the air in exactly 14 minutes flying time.

The Travel Air 6-place cabin monoplane, powered with the 300 h. p. Wright Whirlwind engine, has a high speed of 135 m. p. h., and a cruising range of 430 miles. It is a handsome ship, built for business, roomy, comfortable, dependable, economical.

The Robin 4-place cabin monoplane with 185 h. p. Challenger engine, sister ship of the endurance record holder, the "St. Louis" Robin, attains a high speed of 118 miles an hour and has a cruising range of 525 miles. Smart, swift, modern to the minute, the Robin is the last word in comfort, combined with economy of upkeep and operation.

Curtiss-Wright will gladly furnish complete details on the Robin and Travel Air cabin monoplanes, their adaptability to particular needs, and actual cost figures of operation and maintenance. Address Dept. T. R.- 70



Ray Shrader, Frank Moore, J. E. Moorhead, and B. E. Sibley, sales executives, starting out on a 5000-mile sales promotion tour in a Travel Air Cabin Monoplane (Conoco II)

Sales Division

CURTISS-WRIGHT CORPORATION

27 West 57th Street, New York

(*Continued from preceding page*)

in Rawlins, Wyoming; Marion, Ohio; Petersburg, Virginia, and so forth.

L. A.—Salt Lake Mail Line Extended

EFFECTIVE June 1st, C.A.M. 4, the Western Air Express mail line from Salt Lake City to Los Angeles, will be extended to include San Diego, Calif. Only the first morning trip in each direction will be thus effected, the second trip terminating at Los Angeles as in the past.

REGULATING AIR TRAVEL

The Certificate Requirement for Airline Operation

ALL airline operators were notified recently by the Department of Commerce that they would have to apply for a Certificate of Authority to operate. Any other transport lines to be organized in the future must have such a certificate before inaugurating operations.

The regulation went into effect at midnight, May 15th, and on or before July 15th, every transport operator must make application. A temporary permit may be granted in certain cases where there is a valid excuse for not applying earlier, but these temporary permits will be in force only until the inspector arrives to look over the airline.

For existing airlines, the Department has provided that as soon as application has been received from these companies, a temporary certificate will be granted allowing them to operate until the inspector arrives.

A scrutiny of the provisions of the new regulation does not show much attempt at regulation but rather of periodic inspection. Every detail of a line's equipment and personnel must follow certain rules and meet certain standards. All of which is wholeheartedly approved by the companies in the field now, and the public which entrusts its life to the planes of those companies in the air. Inspection of airlines is just as important as physical examination of pilots. The standards of the companies themselves, though as high as the Department may demand, are not uniform and are subject to more leeway than if the inspection had always had the backing of the Government. Inspection of airplanes has been shown to be necessary and for the good of the industry, and has the support of both manufacturers and pilots. Inspection of operating equipment and methods will have the same effect, and should be welcomed.

The new regulation does not define the sort of efficiency which must be maintained. In generalities it states, for instance, that operating equipment must "be provided with suitable instruments and. . . . be properly adaptable to the nature of the service involved, and to the conditions attendant thereon." Or that: "an adequate number of qualified airmen shall be employed who shall be fully competent in all phases of the particular operation, including the use of equipment, devices, accessories and other aids incident to the operation for which the certificate is issued."

This new law will have several good effects upon the operation of airlines in general; tending to minimize poor inspection and adjustment by field mechanics, and stricter observance of the Department of Commerce regulations by the operating personnel.

Air Passenger Insurance

BOEING AIR TRANSPORT has concluded arrangements with a well-known insurance company to issue travelers' insurance similar to that used on the railroads. A $5,000 policy, good for twenty-four hours, costs only $2. Western Air Express has just announced a similar protection for its passengers.

This is heartening news. It shows that air travel must be beginning to be recognized as a means of transport, not as a short cut to suicide, as many persons fondly believe. The mere fact that an insurance company will accept an air traveler as a risk shows that the situation is vastly different than a year or so ago, when all policies carried a joker clause voiding them in the case of an air accident. Many conservative men will not travel on airlines today because they believe that to do so cancels their insurance. Since ninety-five per cent of them are not carrying any more than $5,000, if as much, that argument seems doomed to the discard.

Do Not Drop Cigarettes From Airplanes

IT SHOULD be unnecessary to admonish people not to drop lighted cigarettes from airplanes, but apparently it must be repeated from time to time by Colonel Young of the Department of Commerce, with emphasis each time. He has just notified all air transport operators that burning cigar and cigarette ends will ignite brush and some kinds of standing timber. He has a long report of Department of Agriculture tests to prove it.

"There now exists in the Air Commerce Regulations," states Colonel Young, "a prohibition in the matter of dropping or releasing objects from aircraft which will endanger life or damage property. Burning tobacco, such as cigars or cigarettes, is definitely within the meaning of the provision. Therefore, it constitutes a violation of the regulations, including the Air Traffic Rules."

Some air transport operators have posted warnings in the cabins of their planes, and in most cases it is effective. All transport lines should have warnings similar to these, and see that they are obeyed. In some cases, however, the offense is not traceable to passengers, but to pilots of private ships and even mail pilots.

THE PASSENGER LINES

Luxury In Extra-Fare Planes

WILLIAM B. MAYO, who is head of the Stout Metal Airplane Division of the Ford Motor Company, has just returned from a long airplane trip to the West Coast and vicinity. He came back with an idea; namely, to adapt the extra fare idea to air transport. The *Twentieth Century Limited*, the *Broadway Limited* and various other railroad limiteds have attained a huge volume of traffic and a very successful financial reward by running a special train with only one or two stops between New York and Chicago, for instance, and charging an extra fare for the time saved. If the train is delayed for any reason so that it does not gain time over the regular schedule, the passenger gets a refund of the amount of the extra fare.

In this way the railroad can equip this special train with all kinds of luxuries and comforts and still make money. Some of them carry barbers, manicurists, valets, stenographers, club cars, observation cars, cars with bedrooms instead of berths, and various other conveniences. The extra fare pays for all this, and more besides. The extra luxury attracts a moneyed clientele who can afford to pay for anything.

Why not, asks Mr. Mayo, equip a transport plane with individual upholstered chairs, davenports, a complete kitchen, writing desk, loud speaker radio and other services of this kind? Why not engage a good interior decorator and get a plane that is beautiful to look at, as well as comfortable. With these thoughts in mind, he proceeded to demonstrate his theory with a 5-AT Ford trimotor, and obtained a plane of remarkable beauty and unexcelled luxury. It was exhibited at the recent New York show.

It had everything but built-in cuspidors. The cabin walls and ceiling were padded with two inches of insulating material which reduced the noise to a minimum. A modernistic rug with odd geometrical patterns covered the floor, and silk curtains adorned the windows. A new ventilating device was installed by each chair, so that by turning a handle one could regulate the supply of air. A radio set was recessed in the ceiling but the dials were easily reached by standing up. The kitchen had a sink, drain board and electric stove, and plenty of supply space above. Special felt-lined racks held dainty china, gleaming silverware and stiffly-creased linen. It even had space for golf bags and gun racks.

Mr. Mayo's plan was to announce this as the Ford-Stout "Club Plane," and sell a few to transport lines for extra-fare service over their regular runs. It was pointed out that, although fares had been reduced and a large number of traveling salesmen and school teachers on vacation were using the airlines, there still remained a substantial number of persons willing and able to pay an extra fare, and entitled to a chance to do so.

This plan has much to recommend it, and would prove practical if the airlines could get a few planes like this. The Stout ledgers are said to be full of unfilled orders now, and production is racing ahead to catch up with orders for the ordinary species of transport plane for lines like S.A.F.E., where traffic is greater than present equipment can handle. When the airlines have enough planes to handle the regular traffic, they may, and probably will, adopt the extra-fare idea and fit up lux-

(*Continued on next page*)

...TEXACO at Miami helps Henry A. Little, Jr. win more races and more prize money than any other...



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Feb. 12, 1930

Mr. Frank Hawks,
The Texas Company,
17 Battery Place,
New York, N. Y.

Dear Mr. Hawks:

I am in receipt of your letter of Feb. 11th asking me to advise you as to my feelings towards your aviation gasoline. All that I can say is that on arriving at Miami I was under the opinion that all aviation gas was about the same, and that it did not make much difference whose name was on the tank so long as it was marked Aviation Grade. Imagine my pleasure and surprise when, upon filling up with Texaco, I found that my motor had gained fifty more R.P.M.s than it had ever shown before. But that was not all. The motor ran much more smoothly, and the motor seemed to accelerate much more quickly on the take-off.

I sincerely believe that Texaco gas had a great deal to do with the fact that my ship won more races **and** more prize money at the Miami Air Meet than any other ship, and was responsible for the efficient service my motor gave me on the Florida Air Tour.

At this time I would like to very highly recommend Mr. Green, his assistants, and the members of the Texaco sales force for their cheerful and ever-ready service. Also your manager and representatives at Jacksonville.

Yours sincerely,

Henry A Little Jr.

Henry A. Little, Jr.

THE TEXAS COMPANY
135 East 42nd Street, N.Y.C.

TEXACO
REG. U.S. PAT. OFF.

TEXACO AVIATION GASOLINE
TEXACO AIRPLANE OIL
TEXACO MARFAK GREASE

(Continued from preceding page)

urious craft for this class of traffic. But that time has not arrived.

"On Your Left, Ladies and Gentlemen—"

PASSENGERS flying over the Southern Air Transport route between Dallas and Tulsa, and soon between Dallas and Cleveland, will be able to tell their friends more about the country flown over than they could formerly. Each passenger now has a radio headphone, over which the co-pilot keeps up a running fire of description, comment and remark. Also, each passenger is given a strip map of the route upon taking his seat in the plane, which he can compare with the description coming to him from the co-pilot's microphone. Because of the noise of the motor, it was deemed inadvisable to use a megaphone, otherwise the technique of a sightseeing bus is complete.

Seriously, however, it is a good thing for the passengers if it is not used so often as to fatigue the listener with a continued patter. The decision to install these headphones and provide the strip maps came after certain passengers had asked the same questions over and over about the identity of this town or that river. Every trip the steward had to tell each passenger, individually, the name of all the points along the route. In this way the passenger is given a complete story on the point being passed, and it is only told once.

Those who are making the trip for the first time and are interested in the terrain below find the new system very satisfactory. Others, as well as business men, salesmen and officials who are otherwise occupied, do not have to listen. Jerry Marshall, operations manager of the line, is responsible for the new innovation.

Change in Colonial Bus System

HEREAFTER, passengers on the Colonial New York-Boston route will be charged a small amount for transportation between downtown hotels and airport. The company's buses being a bit strained by the recent traffic, an agreement was reached with the Capitol Bus Terminal of New York, and the Worcester Street Railway of Boston, to replace the smaller ones with business-like twenty-nine passenger models which will accommodate enough passengers for two Ford planes, if that many desire to make the trip. It will also allow friends of passengers to accompany them to the airport, or meet them there upon the plane's arrival.

Under the new system, buses will leave the Capitol terminal, 51st Street and 8th Avenue, New York, one hour before plane time, and leave the Hotel Pennsylvania forty-five minutes beforehand. In Boston, the buses leave the B. & W. street railway terminal thirty-five minutes in advance and the Hotel Statler thirty minutes in advance.



Mobile engine test stand used by Boeing Air Transport

Bigger Traffic Reports

T.A.T.-MADDUX carried 1,082 more passengers in April than in March, according to a statement lately received in this office. This brings the line's traffic for the first four months of 1930 to the astounding figure of 13,833. The total for April alone was 5,165.

This is the total, of course, for all divisions of the T.A.T.-Maddux system. Some of the rates between points on the line are lower than rail plus Pullman rates. The result is that every month T.A.T.-Maddux is getting more and more of the regular railroad trade. It has increased the daily fleet of Fords and Condors to eighteen, of which only two are Condors but more will be in operation shortly.

Eight planes operate daily on the Eastern division between Columbus and Waynoka, Oklahoma; two on the Western division between Clovis, N. M., and Los Angeles, and eight on the California division between Agua Caliente, Mexico, and San Francisco. Total mileage for the four months of 1930 was 726,956.

Colonial carried 1,460 in April, an increase of 242 over March.

Northwest Airways Extends Line

A new line from St. Paul to Omaha, now reaches that city in time for both the eastbound and westbound Boeing transcontinental planes, it was announced recently by Northwest Airways, Inc., with headquarters at St. Paul.

Planes leave St. Paul daily at 8:45 a.m., and arrive at Omaha at 12:05 p.m., with two stops, Minneapolis and Sioux City. Returning, the planes leave Omaha at 3:10 p.m. and arrive at St. Paul at 6:30 p.m. Fare between the Twin Cities and Omaha is $25; to Sioux City, $20. The schedule also allows connection with the Rapid Air Lines, between Omaha and Kansas City.

NEW DEVICES AND METHODS

Illuminated Glass Letters in Roof

AN EASY method of identification of an airport, either by day or night, is provided in a device announced by the Barns Engineering Co., New York City. It is another adaptation of the glass-steel roof construction in which this firm has specialized for many years.

Known as the Trans-Light Roof, it consists of large glass areas in the form of letters, occupying fifty per cent or more of the total roof space. It gives the name of the airport, transport firm or town. It is clearly visible and easily defined from extreme altitudes, but it is somewhat expensive to install.

By day, the reflection of the sun on the glass letters makes them stand out in bold relief. At night, with a light shining through them from the interior of the hangar, the effect is the same as that of most motion-picture theatres' announcement signs, which are smaller examples of the same idea. It replaces an obstruction light or floodlight for the hangar roof, however, as the light illuminates the whole area.

Skinner Oil Reclaimer

A DEVICE for purifying oil from engine crankcases so that it may be used again has been perfected by the Skinner Automotive Devices Co., Inc., Detroit, Michigan. It is a rather compact machine, and operates as a miniature purification plant for any kind of lubricating oil. It is quite simple in operation.

After the crankcase drainage has been allowed to settle into two drums, allowing much of the solid matter and water to be separated from it, a vacuum reduces the temperature and draws out a continuous supply of used oil through a system of filters and stills.

Arresting Gear For Airports

A SIMILAR device to those used on the Navy aircraft carriers for reducing the speed of a landing airplane may be used on a commercial airport, according to Admiral Moffett, Chief of the Bureau of Aeronautics. In a speech made in New York City on May 9th, he discussed the idea and said it might be possible to use it in the center of cities, if the many engineering problems connected with arresting gears could be applied.

The landing gear on a plane used in such service must be a good deal stronger than the usual type, said the admiral. In addition, it would have to be designed to withstand the special stresses encountered in this service, and the pilot's visibility would have to be such that he could see straight ahead without interference.

On the other hand, the landing platform could be constructed on a circular mount so that the whole field would swing with the wind, in which case a diameter of 300 feet would be sufficient.



Illuminated glass letter as adapted to air-marking hangars roofs

REMARKABLE BARGAINS IN GOOD USED PLANES

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SAVE rental cost—build up your flying hours—own your own plane on easy terms—and earn while you pay. Every ship is licensed for passenger carrying. Many are demonstrators in the pink-of-condition. All have been inspected, checked, put in good flying condition and certified by Curtiss-Wright. Fine flying weather is here now. With a choice of reputable makes, this is your opportunity for pleasure, business, transport or training.

PARTIAL LIST OF AMAZING VALUES

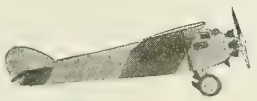
ROBIN—A comfortable, 3-place cabin monoplane—OX engine—D. C. No. 171E—only 58 hours of use—now on display at the Louisville, Kentucky, base—bargain price: $1,975.





TRAVEL AIR—The popular 3-place open biplane—Hisso 150 h. p. engine—D. C. No. C6149—128 hours—completely rebuilt and a beauty—Baltimore, base—price: $2,300.

CESSNA—The 4-place cabin type—225 h.p. Wright Whirlwind engine—D. C. No. NC-6444—only 13 hours in the air—at the Los Angeles, California, base—bargain price: $6,435.





COMMANDAIRE—(Trainer)—2-place open biplane—OX engine—D. C. No. NC-584E—only 10 hours in service—Bridgeport, Conn., base—bargain price: $1,750.

THE CURTISS-WRIGHT GUARANTEE

1. Only **licensed** aircraft and engines are accepted in trade.
2. Used equipment sold only when it is **airworthy**.
3. Every used plane is thoroughly examined. You are given a **complete** and **accurate** report on its condition.
4. An inspection certificate is issued with every sale.

Other fine airplanes, including demonstrators of the Curtiss-Wright line, are on display at the Curtiss-Wright bases listed below. Full details of Curtiss-Wright **guaranteed** used planes, prices and terms of payment will be gladly furnished you. Wire or write the base nearest you, or direct to—

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ROBIN — 3-place Cabin type, OX Engine, D. C. No. NC63H, 59 hours, base Cleveland . $1,950

ROBIN — 3-place Cabin type, OX Engine, D. C. No. C9209, 155 hours, base Raleigh, N. C. $1,475

ROBIN — 3-place Cabin type, Challenger Engine, D. C. No. NC9276, 188 hours, base Baltimore $4,500

ROBIN — 3-place Cabin type, Challenger Engine. D. C. No. NC372K, 179 hours, base Denver $4,500

ROBIN — 3-place Cabin type, Challenger Engine, D. C. No. NC9294, 235 hours, base Boston $4,225

CESSNA — 4-place Cabin type, 300 Whirlwind Engine, D.C. No. NC301M, 15 hours, base Miami $7,850

CESSNA — 4-place Cabin type, Warner Engine, D.C. No. NC8792, 124 hours, base Oklahoma City $3,430

COMMANDAIRE — 3-place Op. Biplane, Warner Engine, D.C. No. NC608E, 85 hours, base Caldwell, N. J. $3,445

COMMANDAIRE — 3-place Op. Biplane, 165 Whirlwind Engine, D. C. No. NC977E, 49 hours, base Kansas City . $4 775

ATLANTA.....Georgia
BALTIMORE.....Maryland
BOSTON.....Massachusetts
BRIDGEPORT....Connecticut
BUFFALO.....New York
CALDWELL.....New Jersey
CHICAGO.....Illinois
CLEVELAND.....Ohio
COLUMBIA..South Carolina
COLUMBUS.....Ohio
DALLAS.....Texas
DENVER.....Colorado
DETROIT.....Michigan
HARTFORD.....Connecticut
HOUSTON.....Texas
INDIANAPOLIS.....Indiana
KANSAS CITY.....Kansas
LOS ANGELES....California
LOUISVILLE.....Kentucky
MEMPHIS.....Tennessee
MIAMI.....Florida
MILWAUKEE.....Wisconsin
MOLINE.....Illinois
NEW YORK.....New York
NORTH BEACH..Long Island
OKLAHOMA CITY Oklahoma
PITTSBURGH....Pennsylvania
PORTLAND.....Maine
RALEIGH....North Carolina
ROCKLAND.....Maine
ST. LOUIS.....Missouri
SAN FRANCISCO California
TOLEDO.....Ohio
VALLEY STREAM..New York

PREPARED RUNWAYS on MODERN AIRPORTS

By William E. Arthur
Manager, Airport Division, The Austin Company

AT the present time there are many different types of airports. Moreover, there will probably always be different types of airports in each large city: airports for high speed commercial traffic; airports for school and student training; airports for military and police service, and industrial airports for experimental and testing purposes. Each of these airports must, necessarily, be designed for its own type of traffic.

When it is considered that there are now in service in this country thirty-two-passenger airplanes having a gross weight of approximately 31,000 pounds, landing at speeds of from sixty-five to eighty miles per hour and that the impact load of these heavy planes equals from one and one-half to three times the load, the necessity for prepared surfaces upon which such planes can land and take off is readily apparent. By prepared surfaces I do not mean the mere sprinkling of oil, calcium chloride or any chemical on the surface of the ground such as nas been done in the past on some fields, and calling this a runway or landing and take-off area.

To insure continuous all-weather operation of heavy passenger or transport planes, prepared landing and take-off areas are essential. The size of these areas is important, and, although the Department of Commerce has laid down certain rules and regulations pertaining to their width and length, they are, however, mainly dependent upon the type of traffic to which the runways will be subjected. The length of the runway varies with the altitude of the airport above sea level; for illustration, a length of 2,500 feet which would be sufficient at sea level would not be adequate for a field 5,000 feet above sea level. At the latter altitude, it would be necessary to build runways to an approximate length of 4,000 feet.

There are many different methods of preparing runway surfaces, including turf, cinders, oiled-earth by the penetration or palative method, asphaltic concrete, cement concrete, and the asphaltic plastic mix type of runway. Or course, all these areas must of runway. Of course, all these areas must treme weather conditions.

Turf

A form of surfacing which is universally applicable, though it may not be universally desirable, is turf. Turf of one kind or another may be grown almost anywhere, and offers a firm, resilient surface practically free from dust, with a fair traction surface. A frequent objection is that turf is not sufficiently durable for airport surfacing material. Of course, it has some disadvantages. During wet or rainy weather its surface tends to become slippery because the grass holds moisture, and, of course, with this surface, it is easier to ground loop or over-shoot the field by skidding. Moreover, basins or soft spots, resulting from the concentration of water in certain areas, are more likely to develop on this type of surface. Records show that more planes have been damaged on improperly drained turf fields, because of the soft conditions of the surface, than on any other type of landing surface. Also, this surface is easily cut up by the common type tail skid. Although this surface is sometimes desirable and practical for smaller airports, it is usually not suitable for large commercial ports.

There are many different kinds of turf, each best suited for a particular condition. Soil and climates differ in various parts of the country. Turf which would give satisfaction in the Southwest, for instance, in all probability would not meet the requirements of the soil and climate in the Northeastern part of the country. It is not at all difficult, however, for the engineer to analyze soil and climatic conditions to ascertain what combination of grasses would be necessary for the particular location of the airport. With the proper maintenance and re-seeding of worn spots, this type of field is admirably adapted for light traffic.

At the airport at Portland, Maine, which is a field of this type, a great deal of study and work was done in determining the best turf, and considering the extreme weather conditions in this part of the country, this field is proving quite satisfactory.

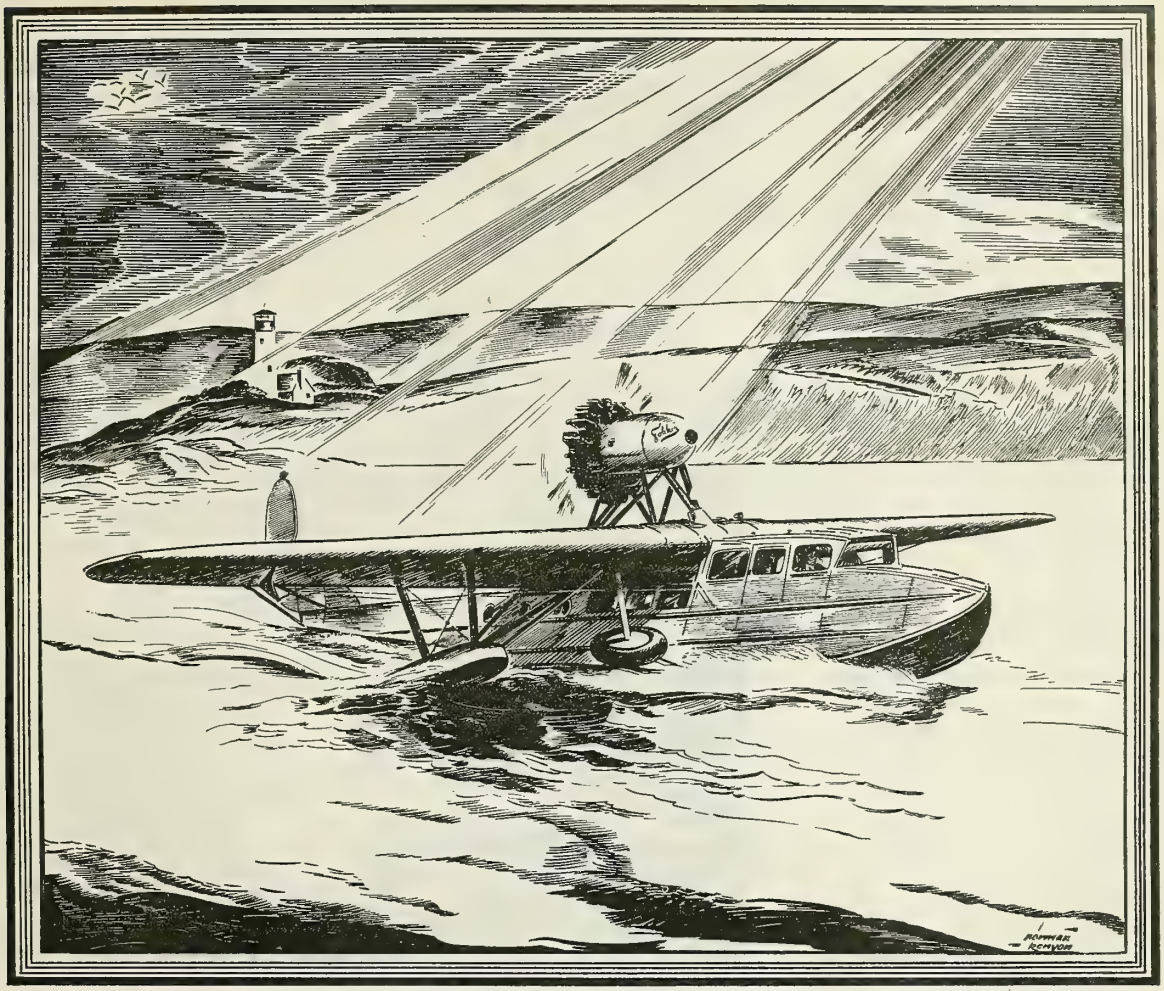
Cinders

Like the turf landing area, the cinder type runway, has advantages and disadvantages.

(*Continued on next page*)



Aerial view of United Airport, Burbank, Calif. Runways are asphaltic plastic mix; hangar aprons are asphaltic concrete



THE AMPHIBION THAT GAR WOOD SELECTED

WHEN Gar Wood, eminent power boat racer and manufacturer, selected a Fokker Amphibion for his personal use, he paid a high tribute indeed to the performance of the plane, and the sturdiness of its build.

Powered with a Wright 525 h. p. Cyclone or Pratt & Whitney 575 h. p. Hornet motors, Fokker Amphibions have a high speed of 112 m. p. h., and a cruising speed of 95 m. p. h. Rigged as flying boats, they have a high speed of 120 m. p. h. For transport or personal use, these ships are also provided with two motors. In considering these ships, prospective purchasers will be interested to know that Fokker has built more airplanes than any other manufacturer in the world, that Fokker planes have made twice as many great pioneering flights as any other make of plane, and that Fokker planes have flown over 25,000,000 miles on transport lines, establishing a record for safety that has never been approached. Because of economies due to production principles of General Motors, prices are probably less than you might expect. Terms may now be arranged on the G M A C finance plan to suit your convenience.

For the use of business executives, for pleasure, and for transport use, Fokker now makes ten different models of airplanes: single and multi-engined types, land planes, sea planes, flying boats, amphibions. Requests for information or demonstration are invited, and will be promptly answered. Fokker Aircraft Corporation of America, General Motors Building, New York.

FOKKER

AFFILIATED WITH GENERAL MOTORS CORPORATION

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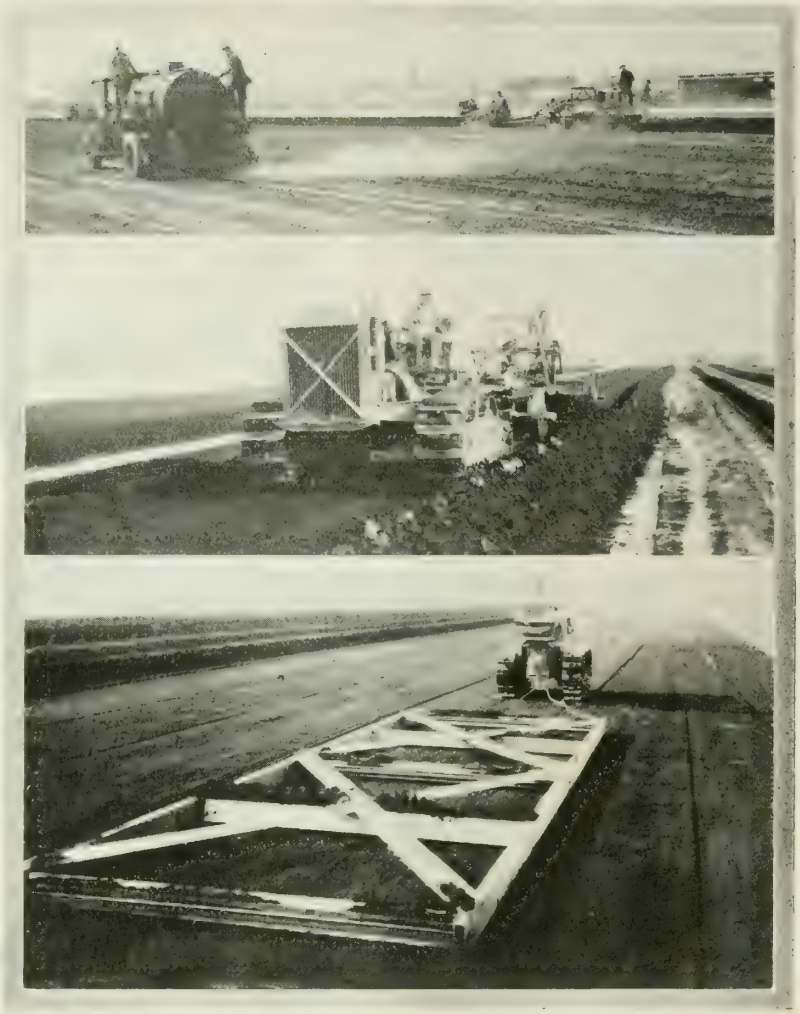
The disadvantages, however, exceed the advantages. One of the real recommendations of a cinder built runway is that it acts as an emergency runway surface that can be quickly built over soft, spongy, wet areas and will act as a base for future runway surfacing. I should not recommend a cinder runway for permanent use, but merely as an emergency measure or preliminary base for future runway surfaces. Since it absorbs artificial light, it has very poor visibility at night under floodlights. Moreover, it involves a high maintenance cost because of its lightness and porosity, is readily damaged by tail skids, and in cold weather has a tendency to freeze up in chunks or balls which have at times broken wheels and torn off tires in landing and taxying. Cinders are easily picked up by the wash of the prop, thrown down the slipstream, taking the finish off the fuselage, filling the cabin with a fine grit, and getting into the valves and operating parts of the engine. It is possible, however, to improve cinder surfaces and at low cost, with the use of oil or asphaltic binder properly applied, mixed and treated, these surfaces can be placed in excellent condition.

Penetration or Pallative Method

The oiled-earth type of runway is a good preliminary low-cost type of surface and is being used on a number of fields throughout the country. Although this type of runway has proved very desirable for small fields or areas used by light ships, it is not sufficient, except in rare cases, for high speed heavy commercial traffic. The surface is not thick enough to eliminate water spots or soggy, muddy areas after rainfall, but makes a very desirable surface for the initial development immediately after the grading has been completed. There is, on all graded areas, a certain amount of settlement, which, of course, can be computed by competent engineers thoroughly familiar with soil conditions. An allowance can therefore be made for settling during the grading period. It is wise, however, to permit this surface to settle thoroughly before permanent surface preparation takes place. In this interim the pallative oiled-earth application works in very nicely. Through study and various experiments with this type surface, we have found it a satisfactory preliminary surface. Some of the airports now in operation using this type of surface for runways are the TAT field at Kingman, Arizona; the TAT field at Winslow, Arizona; the Aero Corporation of California field at Los Angeles, and the field at Albuquerque, New Mexico.

Asphaltic Concrete

To date, asphaltic concrete has not been used very extensively for runway purposes. We find it, however, very satisfactory for areas around hangars, administration buildings, stations and areas where a great amount of taxying is done. It makes an economical working strip in front of hangars, ideally suitable for taxyways to the runways. This type of runway has been used on the United Airport No. 1 at Los Angeles for a continuous apron 150 feet wide in front of all hangars. Also, it is being used for all roadways on the airport, and can be used as a take-off strip when no planes are parked on this area. Asphaltic concrete used as a base for the plastic or elastic type of surface insures long life and low maintenance to this type of runway. There are certain locations and conditions in various parts of the country where the asphaltic concrete type runway would be ideal. This is a matter for the airport engineer to analyze carefully during the designing and engineering of the airport.



Preparing runway surfaces—upper, applying oil treatment; center, scraping surface and distributing materials to proper thickness; lower, dragging after scraping

Cement Concrete

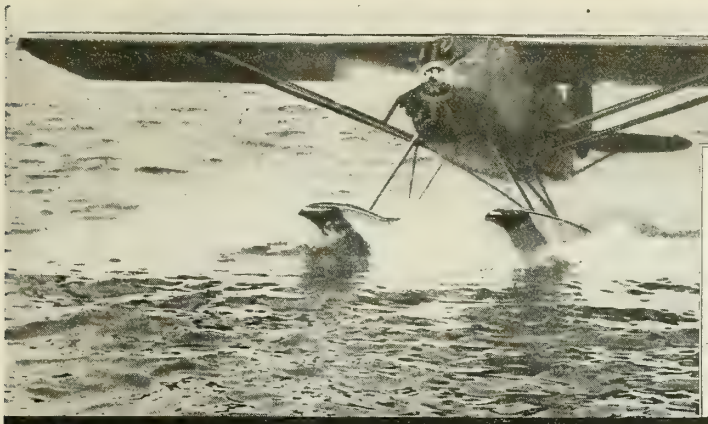
The cement concrete type of runway is now undergoing experiments at some fields. This surface is very hard and does not have a great deal of traction in wet weather. There is a tendency for planes to ground loop on this type of runway after they have lost a certain amount of forward speed. The initial cost of a runway of this type of sufficient width to be safe under all conditions, however, is rather high in comparison to other types of runways. During certain weather conditions, it is very hard on the tires when brakes are applied. All planes, of course, do not land at the same forward speed, the variance being from approximately twenty-seven to eighty-five miles per hour. Therefore, if this type of runway is used, it must have sufficient width and length to meet all of these conditions.

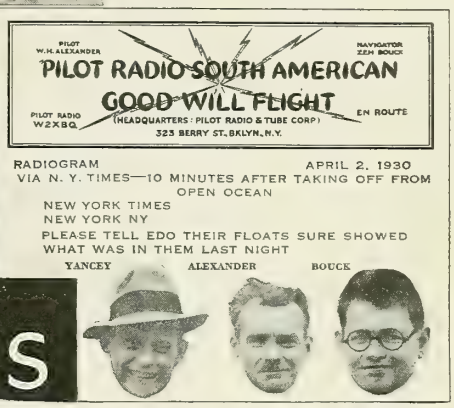
Two airports in the country now experimenting with the cement concrete runway are the Ford Airport at Dearborn, Michigan, and the Glendale field at Glendale, California. I have landed on both fields and consider this type of runway desirable for taking off when the take-off is directly into the prevailing wind.

Asphaltic Plastic Mix

The asphaltic plastic mix type of runway is, in my opinion, by far the best type of runway yet developed for airplane traffic. Having recently completed three runways 3,500 feet long and 300 feet wide of this type of construction, we feel highly gratified with the results. These runways, of course, require considerable engineering and study before definite specifications for them can be determined. Such a study consists of analyzing the soil from chemical

(*Continued on page 104, center column*)





EDO FLOATS

NIGHT in the Gulf Stream . . . a sturdy seaplane heaves and lurches with the changing, surging swells . . . dark waters charge and swirl across the EDO Floats that shoulder the cabin high above the reaching waves . . . each man, in turn, stands watch as his two companions sleep . . . an ocean liner draws close, but aid is declined . . . dawn and a rising sea . . . a takeoff through the foam . . . then a radio message flashes across the 700 miles to New York: "Please tell EDO their floats sure showed what was in them last night."

This was a thrilling part of the epic flight—the first time a plane had ever flown from New York to Bermuda—the first plane ever to land in open ocean on a long flight and again resume the air after a night spent at sea.

The "Pilot Radio," a Stinson cabin monoplane, Wright Whirlwind-powered and equipped with standard EDO Floats, took off heavily loaded from Long Island Sound at 9:37 A. M., April 1st, and laid its nose on a bee-line for Bermuda. Capt. Lewis Yancey, navigator and veteran of one trans-Atlantic flight was in charge. Wm. Alexander, master pilot, had the controls, and Zeh Bouck, radio expert, handled all communications. Messages of progress were continually broadcast. But due to an unavoidable delay at the start, their goal was not sighted by evening. Rather than risk a landing in an unlighted harbor, it was decided to trust in EDO Floats and ride the sea for the night. No wind retarded the ship and the floats took the full 55-mile landing impact on the 15-foot wave crests.

The sea was rougher at dawn, but with EDO Floats and skilled handling, the ship rose swiftly and surely. In less than an hour the tiny spot of land to which Capt. Yancey had laid a straight course, came rolling over the horizon, and with it calm, sheltered water—and triumph!

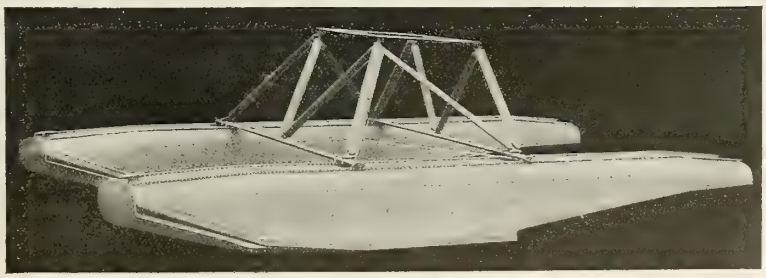
As long as the ocean rolls, honest handiwork will merit reliance. Three men put their trust in EDO Floats and found them not wanting. For EDO Floats, from struts to fluted bottoms, came through the test 100% perfect!

EDO Floats are manufactured in 11 models for the conversion of more than 40 distinct types of land planes up to 8250 lbs. gross weight. They are approved by the U. S. Department of Commerce, and recognized everywhere as the standard of commercial airplanes.

Airplane manufacturers, transport operators and private owners who have not availed themselves of the services of the experienced staff of EDO engineering specialists, are cordially invited to do so. Address, Edo Aircraft Corporation, 610 Second Street, College Point, L. I.

FEATURES TO REMEMBER ABOUT EDO FLOATS

All metal construction.
Protected from corrosion.
Will not swell, shrink or absorb water.
Bulkheaded each 2 feet for protection.
Patented fluted bottoms for quick takeoff.
Heavy keels, shallow sterns for beaching.
Flat decks for ease of taking on loads.
Interchangeable with wheel landing gear.
Easy to install and overhaul.



THE AIR SERVICES

LONG-DISTANCE AERIAL PHOTOGRAPHY

CAPT. A. W. STEVENS of the Army Air Corps has set a new record for long-distance aerial photography by making a photograph covering a distance of 270 miles in a single exposure, according to a recent announcement of the War Department. The former record of 227 miles was established by Capt. Stevens last year.

The photograph was taken at an altitude of 20,000 feet above Crater Lake, Oregon. Shown in the picture which was obtained are Mount Rainier, 270 miles distant in Washington; Mount Hood, at 200 miles; Mount Jefferson, 175 miles; Three Sisters, 125 miles; Diamond Peak, fifty miles; and Crescent Lake, forty-five miles away.

The lens with which the photograph was obtained was developed by Capt. Stevens and is of deep red which appears black to the naked eye. The lens is a type of light filter. A highly sensitized film was used to obtain the photograph.

Capt. Stevens took the picture from an Army Air Corps plane piloted by Lieut. John Corkille. They took off at Mather Field, Sacramento, Calif., at 6:30 a.m. on the morning of the mission and climbed steadily on a flight northward of about an hour. A temperature of twenty degrees below zero was encountered at the maximum altitude of 20,000 feet. Oxygen tanks were used. The plane landed after a flight of approximately four hours when the oxygen supply was consumed.

Mount Rainier, which is 14,000 feet above sea level, was invisible with the naked eye from the plane in which the photograph was taken. The process of obtaining long-distance aerial photographs consists in pointing the camera in the general direction of the objective and snapping the trigger.

Capt. Stevens has announced that he will continue experiments with long-distance photography and will study the development of a camera that will record distances greater than the record of 270 miles which has been established. In order to increase the present record, however, it will be necessary to obtain photographs at a height greater than 20,000 feet, objects as tall as Mount Rainier disappearing below the horizon 300 miles distant at that altitude.

THE design of medals to be awarded by the Navy Department to members of the Navy personnel who made the first transatlantic flight in May, 1929, in the *NC-4*, has been approved by the Fine Arts Commission and the medals will be cast at the United States Mint. A contest for the design of the medal was held by the Navy Department in 1929 and an award of $1,000 will be made to Miss Catherine G. Barton of Englewood, N. J., who submitted the design winning the contest.

Medals will be awarded to the following who comprised the personnel of the flight: Comdr. John H. Towers, commander of the flight; Comdr. Albert C. Read, commander of the *NC-4;* Lieut. Comdr. Elmer F. Stone, pilot; Walter Hinton, formerly a lieutenant in the Naval Air Service, pilot; Lieut. H. C. Rodd, radio operator; J. L. Breese, formerly a lieutenant in the Naval Air Service, engineer; and Chief Aviation Pilot Eugene Saylor Rhodes, engineer.

Pilot Training of Enlisted Personnel

THE Navy Department has instructed the commanders of all ships and shore stations to discontinue the forwarding of recommendations of applications for aviation pilot training from enlisted personnel. This method of obtaining candidates for pilots in the Naval Air Service has been temporarily discontinued pending further need of additional pilots. The number of enlisted pilots in the Naval Air Service will not be reduced.

Applications for pilot training in the Naval Air Service at present on file with the Bureau of Navigation will be retained and selections to fill any immediate vacancies will be made from these applications.

EIGHT new airplanes were recently assigned to the 119th Observation Squadron, New Jersey National Guard, according to an announcement of the War Department. The assignment includes five Douglas observation ships, two Consolidated primary training planes, and one Douglas advanced training plane equipped with a dual control system.



Long-distance aerial photograph taken by Capt. Stevens over Crater Lake. (1) Mt. Rainier, 270 miles; (2) Mt. Hood, 200 miles; (3) Mt. Jefferson, 175 miles; (4) Three Sisters, 125 miles; (5) Diamond Peak, 50 miles; (6) Crescent Lake, 45 miles

CORSAIRS

IN FOREIGN WATERS . . .

with the ASIATIC FLEET



SERVICE in the United States Navy may mean duty anywhere in the world. This is as true of airplanes as of men and battleships.

Corsair No. A-7929 has seen most of its service with the Asiatic Fleet —first with a Light Cruiser Division on board the U.S.S. Trenton, later with the Memphis.

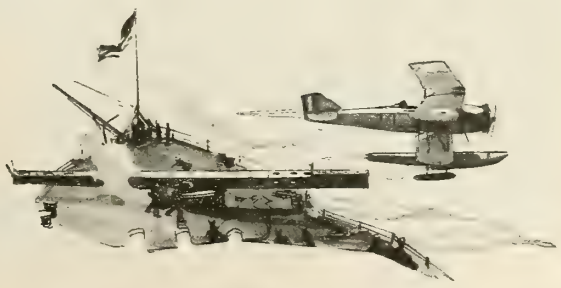
Its duties have been among the hardest any naval plane can undertake—observation.

As a naval observation plane it has been constantly catapulted into the air from the ship. Landings are made alongside the ship. Then the plane is picked up by a crane and swung aboard.

Such catapulting is naturally a severe strain on an airplane. A ship making ordinary take-offs from a smooth airport undergoes no strain which in any manner approaches it.

Corsairs are designed not only for extreme maneuverability but for a ruggedness far beyond ordinary requirements — a staunchness that enables them to meet demands few planes of any type are called upon to meet. Their performance has made them the delight of all naval pilots who fly them. CHANCE VOUGHT CORPORATION, Hartford, Connecticut. Division of United Aircraft & Transport Corporation.

CHANCE VOUGHT CORPORATION



APPROPRIATIONS FOR NAVY DEPARTMENT

THE Naval appropriation bill carrying $380,571,511 for the Navy Department was passed by the House on May 16 and sent to the Senate. The bill provides expenditures of $3,194,000 to begin the $10,000,000 construction program at seven Naval Air Stations and other naval bases requested by the President and previously authorized by Congress. A summary of the appropriation for the development of the Naval Air Stations appeared in the May issue of AERO DIGEST.

FUNDS ARE PROVIDED FOR ARMY AIR CORPS

THE War Department appropriation bill containing provisions for the carrying out of the Five Year Program has emerged from the appropriations committee and has been placed on the calendar of the Senate. The bill provides for a total appropriation of $456,695,864 for the next fiscal year including $3,692,881 for the Air Corps. The provision made for the procurement of planes for the Air Corps is sufficient, according to Assistant Secretary of War Trubee Davison, but the amount authorized for landing fields, hangars, parachute huts and repair shops is inadequate.

COAST-TO-COAST NAVY FLIGHT MISSION

A TRANSCONTINENTAL flight and return from the Naval Air Station, Hampton Roads, Va., to the Naval Air Station, San Diego, Calif., was completed on April 12 by Lieut-Comdr. F. B. Stump of the Naval Air Service, pilot, and E. F. Trimborn, aviation mechanic. The flight was made for the purpose of observing and comparing methods in use in the assembly and repair departments of the station at San Diego with the Station at Hampton Roads. A Vought Corsair was used on the flight.

The plane took off on April 1 and landed at San Diego on April 4, one day being spent on the ground as the result of threatening weather. The return trip was started on April 9 and completed at Hampton Roads on April 12. Data collected by the personnel of the flight at the Naval Air Station, San Diego, included the changes and improvements in the overhaul and repair of aircraft and aircraft engines effected at the station during the past three years. It has been recommended that visits be exchanged annually by officers of the Hampton Roads and San Diego Naval Air Stations.

Information concerning the landing fields used on the flight, including landing area, hangars, repair and servicing facilities for planes was obtained by the personnel of the flight.

The route of the flight was as follows: Hampton Roads, Va., Camden, S. C., Montgomery, Ala., Meridian, Miss. Jackson Miss., Shreveport, La., Abilene, Midland and El Paso, Texas, Tucson, Ariz., San Diego, Calif., and return; El Centro, Calif., Lordsburg, N. M., Odessa, Texas, Jackson Miss., Montgomery, Ala., Camden S. C. and Hampton Roads.



Col. Clarence Chamberlin presenting wreath from Aero Digest to Mrs. Sarah Thompson, Gold Star mother

COL. Clarence Chamberlin presented a wreath on behalf of AERO DIGEST to Mrs. Sarah G. Thompson, first mother of a flier killed in the World War to cross the ocean with the first contingent of Gold Star mothers on a visit to the European battlefields. The wreath was presented during ceremonies coincident with the sailing of Gold Star mothers from New York on May 7, and was accepted by Mrs. Thompson to be placed on the tomb of the American Unknown Soldier in Paris.

ONE pursuit squadron of the First Pursuit Group, Selfridge Field, Mich., will participate in the air meet at Kingston, Ontario, June 3, according to a recent announcement of the Secretary of War.

TWO Model 5-AT, all-metal trimotor transport planes have been ordered from the Ford Motor Company by the Navy Department for use in general transport service. Each plane is equipped with a trap door located in the floor to permit the loading of an engine for transportation purposes. The seats installed in each plane have been designed to accommodate passengers wearing parachutes, and the doors are designed to open quickly to facilitate parachute jumps. Three Pratt and Whitney Wasp engine developing a total of 1,260 horsepower are installed on each plane.

Tests of Cowlings and Exhaust Collector Rings Conducted at Langley Field

TESTS of partial cowling and exhaust collector rings on radial air-cooled aircraft engines have been started at Langley Field, Va., by National Advisory Committee for Aeronautics. Included in the experiments were tests of a Navy XF7C-1 single-place fighter. In level flight with an engine speed of 1,900 revolutions per minute, 144 miles per hour was obtained using a standard service cowling; a speed of 146.6 miles per hour was obtained with a narrow cowling ring. With a wide ring the speed was increased to 152.8 miles per hour. A speed of 155 miles per hour was obtained with an exhaust collector ring. The rate of climb was found to be about the same with each of the cowlings tested.

AS the result of a circular letter to Naval officers inviting applications for training in lighter-than-air flying, the following officers of the Navy have been selected for this training and will be stationed at the Naval Air Station, Lakehurst, N. J., beginning July 1: Comdrs. Philip Seymour and Alfred T. Clay; Lieuts. Anthony L. Denis, Charles J. Maguire, Charles H. Callaway, George W. Campbell, John D. Reppy, and Robert E. Sayre; and Ens. Cyrus T. Clendening and David W. Shafer.

Assignments of Air Corps Reserves

THE following second lieutenants of the Army Air Corps Reserve have been assigned to extended active duty as follows—July 2, 1930, to January 2, 1931: Philip A. Roll and Cedric B. Davis, to Rockwell Field, Calif.; Wilmer E. Hall, to Maxwell Field, Ala.; Carl N. Olsen and Charles C. Cunningham, to Marshall Field, Fort Riley, Kan.; W. Hill Snyder, Fort Bragg, N. C. June 29 to December 27, 1930; Karl H. Halberger, to Fort Crockett, Texas. July 2, 1930, to January 31, 1931: Charles F. Carter, to Pope Field, N. C. June 2 to December 2, 1930: James D. Pendleton, to Pope Field, N. C. April 1, 1930 to March 31, 1931: John V. Mulvey, to Rockwell Field, Calif. July 12 to December 31, 1930: David Johnson, to Marshall Field, Fort Riley, Kan.

CHANGES in the Tables of Basic Allowances for photographic sections of the Air Corps were recommended by a board of five officers which convened recently at Wright Field, Dayton, Ohio. The changes were made for the purpose of effecting economy in the amount of photographic supplies used in the service. The board discussed policies for the betterment of photographic units. The officers composing the board were as follows: Capts. A. W. Stevens and W. D. Wheeler; and Lieuts. G. W. Goddard, Guy Kirksey, and H. K. Baisley.

Pratt & Whitney and Curtiss Engines Ordered by Army Air Corps

A CONTRACT involving a purchase price of $1,450,570.72 has been awarded by the Army Air Corps to the Pratt and Whitney Aircraft Company of Hartford, Conn., for 252 Hornet engines and spare parts. The engines ordered from the company by the Air Corps are of the Hornet Model 1690-A air-cooled direct drive type of power plant. They will be installed in the bombardment planes which the Keystone Aircraft Corporation of Bristol, Pa., has contracted to construct for the Air Corps.

Contract for the purchase of one hundred water-cooled Model D-12-E engines and spare parts involving a cost of $660,280 has been awarded to the Curtiss Aeroplane and Motor Company, Inc., of Garden City, L. I., by the Air Corps. These engines will be installed in Model A-3B attack planes for which a contract has been awarded to the Curtiss company and the Air Corps. These orders for engines are procured from funds available under the appropriations for the Air Corps ending June 30, 1930.



Meet

MISS "LAMOGLAS"

EYES FOR THE SKIES

...AND THE FINEST SAFETY GOGGLE

SHE'S wearing a "Navigator" . . . the finest safety goggle . . . the aristocrat of the famous Lamoglas goggles. Because Lamoglas lenses, obtainable only in genuine Lamoglas goggles, lose less light and cause less refraction than any other non-shatterable lens made, the Lamoglas Navigator prevents eye strain and helps you level off properly, in addition to protecting your eyes in case of mishap. That is why the Lamoglas Navigator is the most popular goggle with experienced pilots. Lamoglas Navigator . . . the perfect vision safety goggle . . . is non-shatterable, ventilated and windproof, with a soft sponge rubber mask frame which automatically fits the contour of the face. Price, $7.50. Fly with a Lamoglas Navigator and you'll agree it's the best goggle you ever wore.

Write for catalog of goggles and flyers' apparel.

BECK

BECK DISTRIBUTING CORP. 68 E. 131st STREET, NEW YORK

Northeaster

FLYING TOGS



Northeaster Helmets

The complete absence of wrinkles insures an excellent appearance. Northeaster helmets are made of the finest and softest gloveskins, with soft two-ply chin strap secured by sure-hold buckles. The goggle straps are two-ply and sewed on to stay.

Model 276—Navy type, brown gloveskin, chamois leather lined. Each $5.50.

Model 274—Navy type as above, but with ear puffs. Each, $6.50.

Model 301—Soft coffee colored capeskin, soft leather lined. Each $5.50.

Model 303—Gray suede leather shell helmet, unlined. Each $3.00

Model 305 — Soft brown capeskin, unlined. Each $3.00.

Excellent Helmets at Popular Prices

Many students find it inconvenient to pay as much as $5.50 for a helmet. The models listed below may not be quite as handsome in finish and detail as the "Northeaster" but they are practical, perfect fitting helmets, made of soft capeskins, and we consider them to be the finest value in the country for the money.

Model 180—Soft brown capeskin, brown cloth lined. Each $3.00.

Model 181—As above, black leather. Each $3.00.

Model 125—Soft brown capeskin, chamois lined with ear puffs, Each $4.00.

White, Green or Red Helmets

Model 290—Made of the softest gloveskins, silk lined. Each $6.00.

Cloth Helmets

Model 273—White soft gabardine, unlined. Each $1.50.

Model 260—Tan soft gabardine, unlined. Each $1.50.

Model 272—Olive drab cloth gabardine, satine lined. Each $2.00.

All helmets supplied in the following head sizes 6¾, 6-⅞, 7, 7-⅛, 7¼, 7-⅜, 7½.

The articles on this page are sold by dealers everywhere, but if more convenient, send us your check or money order for the articles you want and you will receive your purchase by return mail, prepaid. If you do not find the merchandise superior in quality, comfort and appearance, return it to us and your money will be cheerfully and promptly refunded.

TECHNICAL

DR. MUNK JOINS AERO DIGEST

ONE of the world's most noteworthy engineers, Dr. Max M. Munk, has accepted the important post of technical editor on the staff of AERO DIGEST. Dr. Munk's outstanding achievements in the National Advisory Committee for Aeronautics are, of course, familiar to everyone in the aeronautical industry.

He came to this country from Europe to design and construct the wind tunnels at Langley Field, Virginia. He is the discoverer of many important laws of aerodynamics, including the induced drag theory, and is the originator of widely used wing curves, including the Göttingen and M airfoil sections. Beginning in our July issue, Dr. Munk will furnish monthly contributions explaining the most modern aerodynamical developments of the present and forecasting the progress of aeronautical science for the future.



Dr. Max M. Munk

WACO MODEL F BIPLANE

APPROVED Type Certificate 311 has been granted to the Waco Aircraft Company on its model F with the Warner Scarab engine. The same model ship with the Kinner 100-horsepower engine has been given Approved Type Certificate 313.

This new ship is a three-place open-cockpit biplane employing the modified Heinkel truss in the wing construction. In size it is slightly smaller than the other models, the wing area being 240 square feet against 288 square feet for the standard Straight Wing models.

Good visibility forward and down is obtained by the 50 per cent stagger of the wings, the cut-out center section increasing the visibility overhead. An improved aileron control has been designed for the ship; the shape of the ailerons producing a taper wing appearance. Molded Pyralin windshields, a departure from the conventional types, increase the protection in the cockpit.

The curve of the rudder is carried out in the vertical fin streamlined into the fuselage, the horizontal stabilizer curving out to the flippers. A tail wheel is provided in place of a skid.

The undercarriage, of biped construction, is supported by oil and spring shock struts with Air Wheels and brakes as standard equipment. The curve of the fuselage is carried out in the cowling up to the engine, the cowling being divided into four sections for easy accessibility to the engine.

The pilot's cockpit is equipped with instruments well placed on the instrument panel, space being left for a bank and turn indicator directly above the compass. The seat, bucket type, is deep enough for a parachute, and yet high enough for the pilot to see over the heads of the passengers. Rudder pedals are conveniently placed.

In the passengers' cockpit, seat cushions are removable and are staggered. The passengers sit down deep in the cockpit but have good visibility. The dual control attachments are beneath the floor board, leaving it free for such baggage as may be desired. A V-type front panel is equipped with two compartments for the stowing away of helmet, goggles and other small parcels. For instruction purposes, the cushions are rearranged and dual controls are easily installed.

The brakes are independently controlled and operate in conjunction with the rudder, off the same foot pedals. The auxiliary hand control enables both brakes to be locked simultaneously. Brake controls are installed in both cockpits. Provisions are made for disconnecting the operation of the brake controls in either cockpit, a necessary feature in student training. The instructor can have the use of the brakes for emergency purposes.

The performance of the new model F is reported to be good; quick take-off, rapid climb, slow landing speed, inherent stability, no "floating" tendency, etc.

Specifications

Span	29 feet 6 inches
Length	20 feet 8 inches
Height	8 feet 4 inches
Chord	57 inches
Wing area	240 square feet
Weights empty	
Kinner	1095 pounds
Warner	1110 pounds
Gross weight	1900 pounds
Gas capacity	32 gallons
Top speed	115 miles per hour
Cruising speed	95 miles per hour
Landing speed	32 miles per hour
Climb, first minute	1,000 feet

BENT LAMINATED GLASS LENSES

A PROCESS for making bent laminated glass lenses for aviation goggles has been developed by Strauss and Buegeleisen of Brooklyn, N. Y., and the company has started the manufacture and distribution of Bent Resistal Goggles which are produced by means of this process.

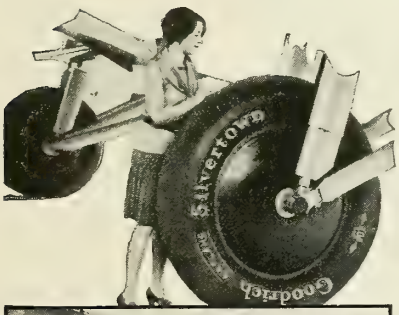


Waco Model F, a three-place open-cockpit biplane which has a speed range of 32 to 115 miles per hour



Longest regularly operated airway in the world *uses* Goodrich

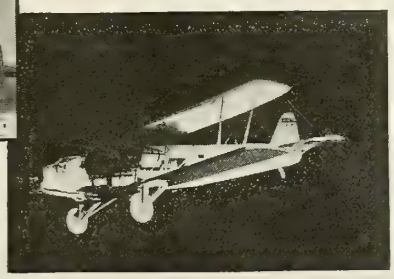
BOEING AIR TRANSPORT CO., INC. INAUGURATE 20-HOUR NIGHT AND DAY SCHEDULE ON SAN FRANCISCO-CHICAGO ROUTE





52 x 12 Goodrich Silvertown Tires and the landing gear of these transports withstand a landing impact of 43 tons.

Of the millions of miles flown by Boeing, half of them are flown by night. (Right)



SEA LEVEL to 12,000 feet . . . ground temperatures of 20 degrees below zero to 120 degrees F. . . . landing impacts of 43 tons . . . various types of air ports . . . rigid schedules . . . here are but a few of the altitude, climate and flight conditions that Boeing 18-passenger tri-motor transports are called upon to withstand.

In operation on a 20-hour night and day schedule between the Golden Gate and Lake Michigan, these planes must be dependable, sturdy, air worthy under every condition of flight. Above all, they must have *proved* equipment.

Dependability in any emergency . . . long wear under the most trying conditions . . . constant performance . . . prove Goodrich Silvertowns a worthy choice for use on the longest regularly operated airway in the world. Silvertowns insure *safety* and *protection* for both passengers and plane. Pilots *choose* them.

The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ont.

Goodrich *Rubber for Airplanes*

. . . another B. F. Goodrich Product

Over 40 rubber articles for airplanes - Silvertown Tires - Tail Wheels - Streamline Windshields - Hose - Tubing - Engine Mounts - Crash Pads - Accessories

LIGHT AIRPLANES OF ITALY

(Concluded from the May issue)

By Paul E. Lamarche

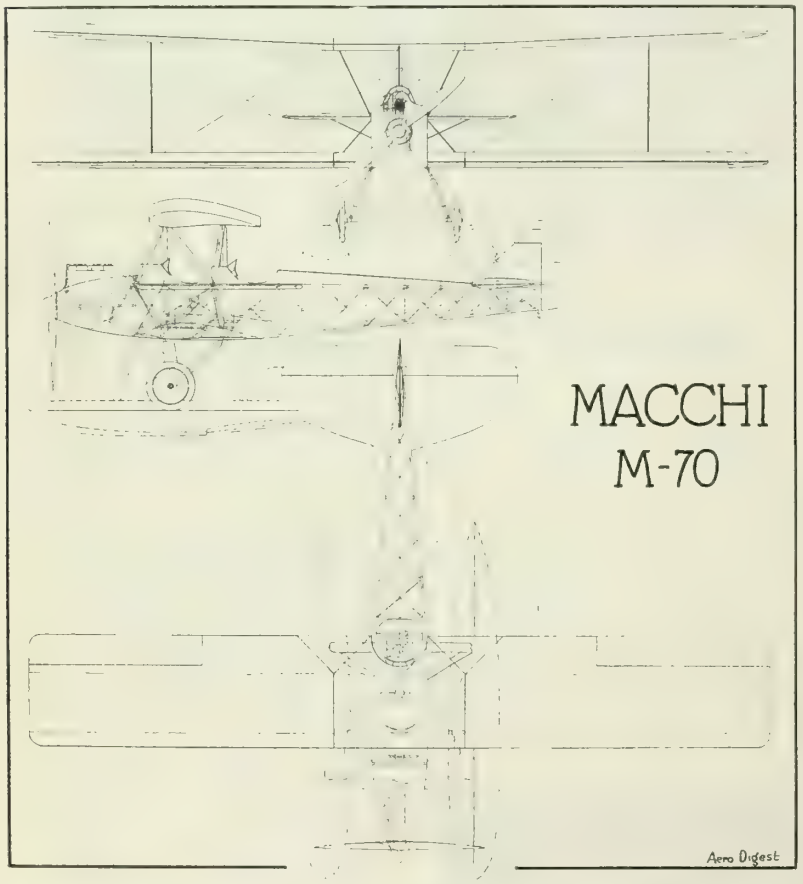
IN the first part of this article published last month information and illustrations were given of three well known Italian light planes. Six more planes in this classification are described in the present installment.

MACCHI M-70

The Macchi M-70 is a two-seater open-cockpit biplane of mixed construction and is built by Aeronautica Macchi at Varese. The Macchi plant was founded in 1912 and during the war built Nieuport planes. More recently it has become well known for its Schneider Cup racing planes. The Macchi light plane, which was built for participation in the Montecelio contests, has a maximum speed of 96 miles per hour with the Cirrus Mark II motor. Like other Italian light planes, it can be quickly converted into a seaplane and has folding wings.

On the Macchi M-70 the wings have a section of medium thickness and are of wood construction with fabric covering. The upper wing, which has a dihedral of three degrees, is attached to a wide center section which is supported by N-struts of steel tube over the fuselage. The lower wing, which has no dihedral and to which the ailerons are fitted, is attached to short wing roots which are supported by steel tubular N-struts extending from the upper longerons of the fuselage.

The fuselage is of wood construction with a plywood covering. There are two cockpits in tandem which are fitted with dual control, the pilot occupying the aft seat. The forward cockpit is placed under the wing, and the after cockpit under the cut-out in the upper wing. Both seats are arranged for the use of parachutes. The empennage is of welded steel tube construction. The rudder only is balanced. The landing gear is of the cross-axle type with shock absorbers struts. The fuel tank is contained in the center section of the upper wing and has a capacity sufficient for five hours' flight.



Scale drawings of the Macchi M-70 folding wing convertible biplane

Specifications

(Cirrus Mark II 80-horsepower engine)

Span	32 feet 8 inches
Length	23 feet 2 inches
Height	9 feet 8 inches
Wing chord	4 feet 10 inches
Wing area	306 square feet
Weight empty	1,015 pounds
Weight of fuel	203 pounds
Weight of oil	22 pounds
Weight of pilot and passenger	330 pounds
Total weight	1,632 pounds
Wing loading	5.3 lbs. per sq. ft.
Power loading	21 lbs. per h.p.
High speed	93.6 miles per hour
Minimum speed	34.2 miles per hour
Climb to 3,280 feet	7 minutes
Climb to 6,500 feet	16 minutes 30 seconds
Climb to 9,840 feet	31 minutes
Climb to 13,120 feet	53 minutes
Service ceiling	15,100 feet

PIERO MAGNI

Piero Magni of Milan has been experimenting on various light plane types of his own conception with the view of constructing light touring planes utilizing his ideas for radial and in-line engine cowlings and variable incidence wings. He has built two light monoplanes known as the Vittoria, a one-seater, and the bi-Vittoria, a two-seater plane which was constructed last year. The



The Macchi M-70 two-seater as a landplane and as a twin-float seaplane

Vittoria is a high-wing monoplane powered with 60-horsepower Anzani motor which is well cowled in. Its fuselage is of oval section and well streamlined. The cockpit is behind the trailing edge of the wing and has a headrest at the back. The empennage consists of a long fin and an unbalanced rudder which extends beyond the horizontal surfaces which are supported below it. The plane is very diminutive in size, having a wing span of twenty-six feet two inches and a length of eighteen feet. Its maximum speed is eighty miles per hour. The bi-Vittoria is constructed somewhat after the design of the Vittoria, but a detailed description is not at present available.

Specifications

(Anzani 60-horsepower engine)

Span	26 feet 2 inches
Length	18 feet
Height	6 feet 6 inches
Wing area	105 square feet
Weight empty	639 pounds
Weight of fuel	77 pounds
Weight of oil	48 pounds
Weight of pilot	165 pounds
Total weight	926 pounds.
High speed	80 miles per hour
Climb to 3,280 feet	4 minutes 30 seconds
Climb to 6,560 feet	13 minutes

PIAGGIO P-9

The Piaggio P-9 is a two-place high-wing cabin monoplane, which like many other light planes in Italy, was built for the light plane competitions at Montecelio. It is built by the Societá Anonima Piaggio & C., of Genoa, which is a well-known engineering firm that has been associated with the Societá di Construzioni Meccaniche Aeronautiche in the construction of Dornier flying boats, which are built under license in Italy for use on the commercial airlines. The Piaggio P-9 was originally built to use a Cirrus Mark II engine but is now adaptable for the use of any air-cooled engine either radial or in-line up to 150 horsepower. With the Cirrus engine, it has a maximum speed of 106 miles per hour.

The wing is built in three sections and is composed of a center section which rests on the top of the fuselage and two outer sections which are rigidly braced by parallel tubular steel struts extending to the lower longerons of the fuselage, which are in turn braced by diagonals. The wing is of wood construction with a fabric covering and the long ailerons are rigidly controlled. The fuselage, which has a rectangular section and is quite deep around the cabin, is of wood construction with a plywood covering. There are four doors, two on either side, which give entrance to the two seats in tandem. Windows form the upper parts of the doors and the front of the cabin is enclosed by glazed panels. Dual control is provided, and the seats are arranged for parachutes. The empennage is of the monoplane type and is of wood construction with fabric covering. The landing gear is of the cross-axle type with two units in Vee being attached to the lower longerons of the fuselage, the forward struts of which are equipped with shock absorbers. The axle is braced at the center by a steel tube pyramid. When the Piaggio P-9 is fitted with floats, it is known as the P-9bis. The fuel tank in the wing has a capacity of forty gallons, which is sufficient for a range of six hours.



Cant. 26 light plane built by the Cantiere Navale Triestino

Specifications

(Cirrus Mark II 80-horsepower engine)

Weight empty	970 pounds
Useful load	617 pounds
High speed	105.6 miles per hour
Minimum speed	39.7 miles per hour
Climb to 3,280 feet	6 minutes
Climb to 6,560 feet	15 minutes
Climb to 9,843 feet	27 minutes
Service ceiling	14,800 feet

CANT. 26

Another Italian light plane of the open-cockpit two-seater biplane type is the Cant.26 which is built by the Cantiere Navale Triestino of Monfalcone, a large industrial organization founded in 1907 and now operating important ship yards, electrical works, railroad workshops and an aircraft factory. The aircraft plant was opened in 1923 at the instigation of Mussolini, who was anxious to bring Italian aviation up from the low ebb after the war. Most of the planes built by the Cantiere Navale Triestino have been flying boats designed for military and commercial flying, the trimotor Cant.22 flying boat for twelve passengers being its largest commercial craft. The Cant.26, the light touring plane, was built in response to the invitation of the Italian Air Ministry and was entered in the Montecelio competitions of 1928.

The wings, which can be folded, are of wood construction with fabric covering and have a semi-thick section. The upper wings are attached to a center section which is supported by cabane struts of hollow steel tube. This center section contains the fuel tank which has a capacity sufficient for a range of 435 miles. The lower wings, which are attached to short wing roots, are fitted with ailerons which extend nearly all of the span. The wings are braced by a set of interplane struts close to the fuselage and by a second set near the extremities.

The fuselage has a nearly rectangular section with an arched top and is of wood construction with plywood covering. The forward cockpit is under the wing, and the other, which is normally used by the pilot, is under the trailing edge of the wing. As in other Italian light planes, dual control is provided and provision is made for parachutes.

The empennage is of the monoplane type. It consists of a stabilizer and elevating plane of wood construction, the former having fabric and the latter having a plywood covering. The fin and balanced rudder are of steel tube construction and are covered with fabric. The landing gear is of the cross-axle Vee type, the rear legs of which are equipped with shock absorbers. The Cant.26 can be powered with any engine of the air-cooled in-line type to 100 horsepower and has a maximum speed of 101 miles per hour with an 80-horsepower motor.

Specifications

(Isotta-Fraschini 80-horsepower engine)

Span	32 feet 10 inches
Length	23 feet
Height	8 feet 9 inches
Wing area	282 square feet
High Speed	93 miles per hour
Minimum speed	38 miles per hour
Weight empty	814 pounds
Weight of fuel	264 pounds
Weight of pilot and passenger	352 pounds
Total weight	1,430 pounds
Wing loading	5.1 lbs. per sq. ft.
Power loading	17.9 lbs. per h.p.
Ceiling	16,400 feet



Plaggio P-9 Cabin monoplane with 80-horsepower Cirrus engine

(*Continued on next page*)

(Continued from preceding page)

CAPRONI 100-T

The Caproni 100-T is a two-seater open-cockpit biplane originally built by the Caproni firm of Milan for the light airplane competition at Montecelio. The Caproni firm, which is well known as the constructor of a number of successful military and commercial planes, owns the license in Italy to build the DeHavilland Moth. Although incorporating a number of Moth characteristics, the Caproni 100-T does not, however, adhere strictly to the design of the English plane. In the trials at Montecelio, a 100-T piloted by De Bernardi placed first against a field of nine competitors, and more recently a Caproni 100-T piloted by Gamma was classed first in the Circuit Lazio, which was organized by the Aero Club of Italy for Italian light planes.

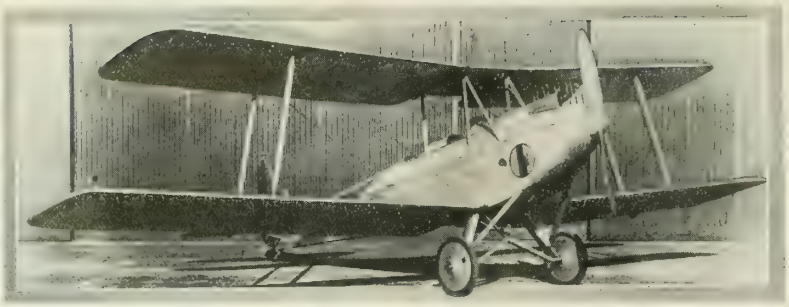
The Caproni is a folding wing plane. Wings are of unequal span and are designed after those on the large Caproni bombing planes, the lower wing having the greater span, which arrangement is claimed to give the plane a quicker take-off and a slower landing speed. The two wings have a dihedral of slightly more than three degrees and are of wood construction with fabric covering. The ailerons, which are on the lower wings only, have differential control and are balanced. The center section of the upper wing serves as a fuel tank. The upper wing is fitted with Handley-Page slots, Caproni having acquired the license for them in Italy.

The fuselage is of wood construction with a plywood covering, except for the cowling and forward part which has a covering of duralumin. The cockpits are arranged in tandem, the pilot's seat being in the rear. There is a small baggage compartment aft of the cockpits. The empennage is of the monoplane type with balanced rudder. The landing gear is of the divided type and is similar to that on the Moth. It can be easily replaced by floats. The Caproni 100-T can be powered with any air-cooled in-line engine of 85 to 100 horsepower, and has a maximum speed of 102 miles per hour with the DH Gipsy. As in the case of other light planes in Italy, the Caproni plane is equipped for night flying and carries a small searchlight on its undercarriage.

Specifications

(DH Gipsy 85-horsepower engine)

Span	27 feet 5 inches
Length	24 feet
Height	9 feet
Wing area	262.5 square feet
Weight empty	882 pounds
Weight of pilot and passenger	330 pounds
Weight of baggage, etc.	88 pounds
Weight of fuel	198 pounds
Disposable load	616 pounds
Total weight	1,498 pounds
Wing loading	6.3 lbs. per sq. ft.
Power loading	17.6 lbs. per h.p.
Range at cruising speed (time)	5½ hours
Range at cruising speed (distance)	435 miles
High speed	101.84 miles per hour
Minimum speed	39.7 miles per hour
Take-off run	350 feet
Landing run	260-345 feet
Climb to 3,280 feet	7 minutes 40 seconds
Climb to 6,560 feet	17 minutes 24 seconds
Climb to 8,200 feet	23 minutes 18 seconds
Service ceiling	13,120 feet



The Caproni 100-T which is similar in many ways to the D H Moth

BONOMI MONOPLANE

The Bonomi is a newcomer among Italian light planes and has recently been introduced by its constructor, Vittorio Bonomi, of Milan. The plane is convertible into a one, two or three-place high-wing cabin monoplane and is accordingly adaptable for air-cooled engines of various power ratings. It has been tested with the 25-horsepower Anzani radial type motor and the Armstrong-Siddeley Genet 80-horsepower motor. With the Genet engine, the Bonomi monoplane has a maximum speed of ninety-three miles per hour.

The plane has a semi-thick wing of large span which is of wood construction. It is rigidly braced on either side by oblique struts extending to the lower fuselage longerons. The fuselage contains a cabin which is normally fitted with two seats in tandem. Entrance is by four doors. All doors are fitted with glazed panels, and a small window in the after part of the cabin gives additional light. The front part, which is entirely enclosed, is fitted with glazed panels and arranged so as to give the best visibility. In its tests the plane took off in sixty-five yards and landed in eighty-seven. Bonomi plans to build these one, two and three-place cabin monoplanes with a price range of from $2,632 to $3,000.

Specifications

(Armstrong-Siddeley 80-h.p. Genet engine)

Span	36 feet 1 inch
Length	21 feet 3 inches
Height	10 feet 1 inch
Weight empty	771 pounds
Useful load	496 pounds
Total weight	1,267 pounds
High speed	93 miles per hour
Take-off run	196 feet
Landing run	262 feet
Climb to 3,280 feet	7 minutes
Climb to 6,560 feet	15 minutes

BERGAMASCHI

The Cantieri Aeronautici Bergamaschi of Bergamo has been operating a flying school and airplane repair plant, and since 1927, has designed and built several training planes. It has entered the light airplane industry with the production of a two-seater biplane powered by an air-cooled in-line engine. Information concerning this light plane, however, is not available at present.

TORSION OF MEMBERS HAVING SECTIONS COMMON IN AIRCRAFT CONSTRUCTION

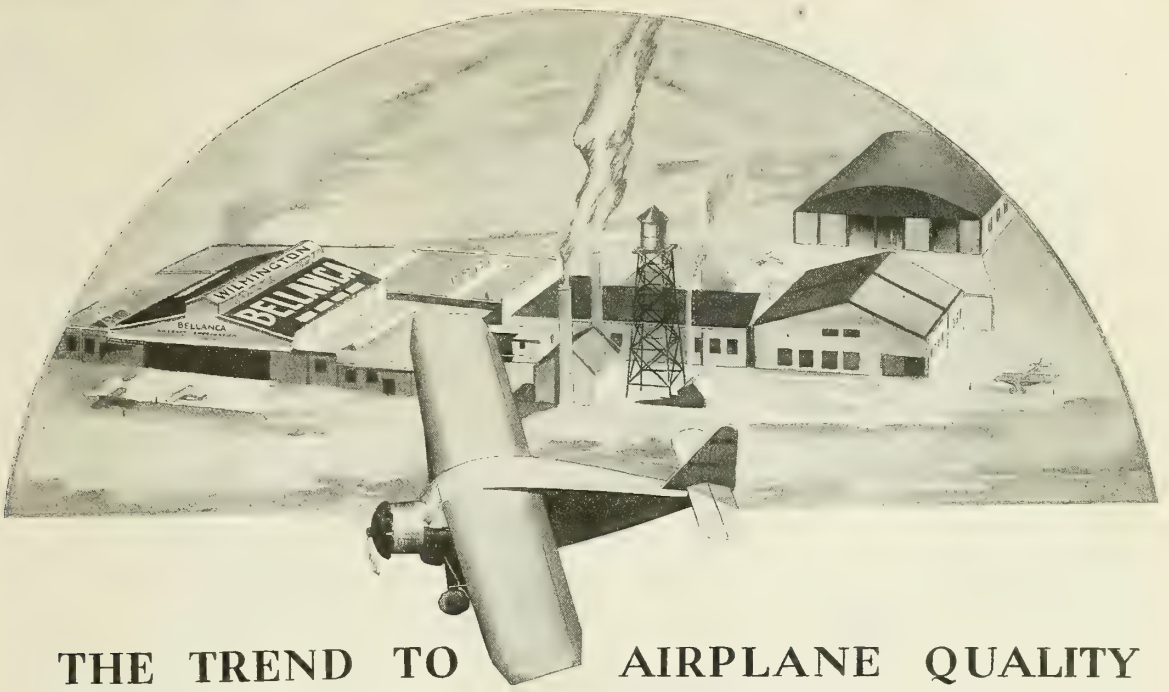
REPORT 334 of the National Advisory Committee for Aeronautics entitled, "The Torsion of Members Having Sections Common in Aircraft Construction," was prepared by George W. Trayer and H. W. March. This publication gives the results of investigations of the torsion of structural members undertaken by the Forests Products Laboratories, and reviews the fundamental theory of torsion, showing how the more common formulas are developed from it.

The principal object of the investigation was to determine by experiment and theoretical investigation how accurate the more common formulas are and on what assumptions they are founded, and, if none of the proposed methods proved to be reasonably accurate in practice, to produce simple, practical formulas from reasonably correct assumptions, backed by experiment. A second object was to collect in readily accessible form the most useful of known results for the more common sections.

It is shown by a series of tests of prisms of simple section that wood is a suitable material for the experimental investigation of the torsion problem. Accordingly, wood was used for the experiments on full-sized members because of the ease with which it can be worked into different shapes and because of its low torsional stiffness. The possible effect of different moduli of rigidity in radial and tangential planes was investigated mathematically, and the effects of rate of loading and of moisture content were determined experimentally. Furthermore, soap films were used in order to take advantage of a mathematical similarity that exists between the torsion problem and the problem of finding the deflection of a thin membrane under pressure. The analogy is discussed in detail in the report.

Experimental work with beams of irregular sections that have not yielded to mathematical treatment is described. From these experiments and certain mathematical considerations, empirical formulas are set up for irregular sections whose component parts are rectangles.

Report 334 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.



THE TREND TO AIRPLANE QUALITY

brings engineering to the front

EXPERIENCE in various types of aircraft has already awakened thousands of men and women to the fact that there is, after all, a difference in airplane quality. People want to know *why* one plane stands out above all others for its higher degree of proved efficiency, longer life in service, greater ruggedness, steadier flying characteristics, and its cleaner score for safety.

Bellanca welcomes this trend to quality and dependability. Since 1908, Bellanca has refused to be diverted from the fundamentals of sound aerodynamics as proved in original features of airplane design. The Bellanca factory is the symbol of Bellanca progress. At this thoroughly equipped plant *the first consideration is the purchaser of Bellanca monoplanes.* To his satisfaction and safety, every effort is bent in terms of the finest materials obtainable, fabricated by a group of the most successful engineers in aviation. As a result, there is a real significance in the statement — "Built as Only Bellanca Can Build."

When each completed Bellanca leaves the production line and receives its test flights, an airplane has been built to standards so high — to a design evolved from such wide experience — that its new owner can say with perfect confidence, "I own America's finest airplane!"

BELLANCA AIRCRAFT CORPORATION
NEW CASTLE, DELAWARE
Canadian Distributors:
Bellanca Aircraft of Canada, Ltd., Montreal

The Bellanca Pacemaker is a six-place cabin monoplane with 300 h.p. engine, finished in finest automobile coachwork. High speed, 145 m.p.h. Payload with pilot, 1,235 lbs. U. S. Dept. of Commerce Approved Type Certificate No 129. *The Bellanca Skyrocket,* of similar specification, is powered with the 420 h.p. Wasp engine. High speed, 150 m.p.h. U. S. Dept. of Commerce Approved Type Certificate No 319. Both types are readily convertible into excellent seaplanes. *The Bellanca Airbus* is a 12 to 14 passenger single-engined monoplane, particulars of which will be sent on request to any commercial operator.

BELLANCA

SCHUBERT VALVELESS ENGINE

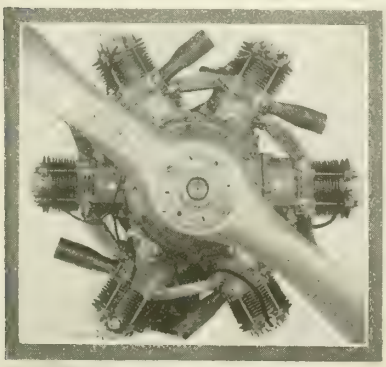
A NEW six-cylinder two-cycle radial air-cooled engine of 60 to 95 horsepower has been developed by Aircraft and Industrial Motors Corp., of New York City. This engine has been tested on a block with full propeller load, running at speeds of from 1,200 to 3,200 revolutions per minute for more than 950 hours. It was then installed in an Aeromarine-Klemm airplane and flight tested.

This engine consists of only 42 parts of which the pistons, connecting rods and the crankshaft are the only ones which move. The fuel consumption is less than .45 pound per horsepower hour. Volumetric efficiency is said to be 75 per cent greater, the cost of manufacture 75 per cent less than conventional four-cycle engines, and the manufacturer claims the engine will run satisfactorily for 1,500 hours without overhauling or major adjustments.

The engine has two staggered, overlapping, circumferential rows of stepped cylinders, with the cylinders in each row offset longitudinally on the crankcase to allow room for all of the connecting rods and permit the pistons in that row to be connected to a single crank. There are three cylinders in each row, and the crankshaft has only two throws.

Pistons are stepped and are each made of a single casting. Both the pistons and the stepped cylinders have provision for taking care of the difference in expansion and construction resulting from temperature difference. The enlarged ends of the stepped pistons constitute fuel supply pistons which deliver fuel to the working cylinder next behind in the other row of cylinders. With an odd number of cylinders in each row, simultaneous explosions take place in diametrically opposed cylinders, one arranged in one row and the other in the other row, providing good counterbalancing and reducing vibration.

The fuel cylinders are cylindrical sleeves which are inserted in the base portions of the stepped cylinders and which project into the crankcase. These sleeves have fuel intake ports which are uncovered by the fuel supply pistons, and the fuel charges are sucked into the cylinders ready to be compressed and delivered through the fuel ducts or conduits to the working cylinders when the fuel supply pistons are approaching the outer ends of their strokes. With three cylinders arranged in a row, the timing is such as to get the proper fuel compression when the intake ports of the working cylinders are uncovered by the working pistons.



Schubert two-cycle engine

The engine has a homogeneous gear reduction which is claimed to be almost noiseless and which is unusually light in weight.



Aeromarine with Schubert engine

The fuel is atomized through the process of supply, the exhaust being almost pure carbon dioxide.

Fuel mixture, to which a little lubricating oil has been added, is admitted to the crankcase in which some of the oil is condensed under the partial vacuum maintained therein at all times, thereby affording adequate lubrication for all of the bearings and the pistons.

Each cylinder supplies the adjacent cylinder with fuel in an anti-clockwise direction as the propeller rotates in the clockwise direction. The fuel supply continues to be supplied to the combustion chamber of the rear cylinder as the piston is on its upward stroke for nearly 60 degrees, at which time the supply piston is on its top center, at the same time having also compressed and exploded the fuel supplied to it by the front cylinder. This process is continuous in double action from one cylinder to the other around the circumference, two cylinders firing simultaneously every 120 degrees, with volumetric efficiency as the fuel is supplied slightly above atmospheric pressure measured to the desired amount.

Another interesting feature is the crankshaft and connecting rod assembly. Each of the connecting rods is made of one piece and has special roller bearings. The connecting rods are assembled on the crankshaft during the process of assembly.

EFFECT OF COWLING ON CYLINDER TEMPERATURES AND PERFORMANCE

N. A. C. A. Report 332, by Oscar W. Schey and Arnold E. Bierman, presents the results of tests conducted by the staff of the National Advisory Committee for Aeronautics to determine the effect of different amounts and kinds of cowling on the performance and cylinder temperatures of a standard Wright J-5 engine. These tests were conducted in conjunction with drag and propeller tests in which the same cowlings were used.

The engine was mounted in the nose of a cabin fuselage and placed in the air stream of the Committee's twenty-foot Propeller Research Tunnel, which is located at the Langley Memorial Aeronautical Laboratory. The power was measured by means of a torque dynamometer placed within the fuselage. Sixty-nine iron-constantan thermocouples and three recording pyrometers were used for obtaining the cylinder temperature measurements.

Four different cowlings were investigated, in tests herein reported, varying from the one extreme of no cowling on the engine to the other extreme of the engine completedly cowled and the cooling air flowing inside the cowling through an opening in the nose and out through an annular opening at the rear of the engine. Each cowling was tested at air speeds of approximately 60, 80 and 100 miles per hour.

For the conventional type of engine cowling the results of these tests indicate that increasing the amount of cowling has the advantage of reducing the drag, but the disadvantage of increasing the cylinder barrel temperatures. Satisfactory cooling was obtained with the conventional cowling that covered thirty-five per cent of the cylinder cooling area. With the conventional cowling that covered seventy-three per cent of the cooling area, the cylinder temperatures were excessive even though a large portion of the cooling air was permitted to flow inside the cowling through slots in the front of the cowling.

For the cabin fuselaeg with the N.A.C.A. cowling, which completely enclosed the engine and took in all of the cooling air through a twenty-eight-inch diameter opening in the nose, the drag was reduced forty per cent at 100 miles per hour, as compared with the same unit with no cowling on the engine. The mean temperatures of the spark-plug boss and the cylinder head were slightly reduced for the same test conditions, but the barrel temperatures were increased.

Report 332 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

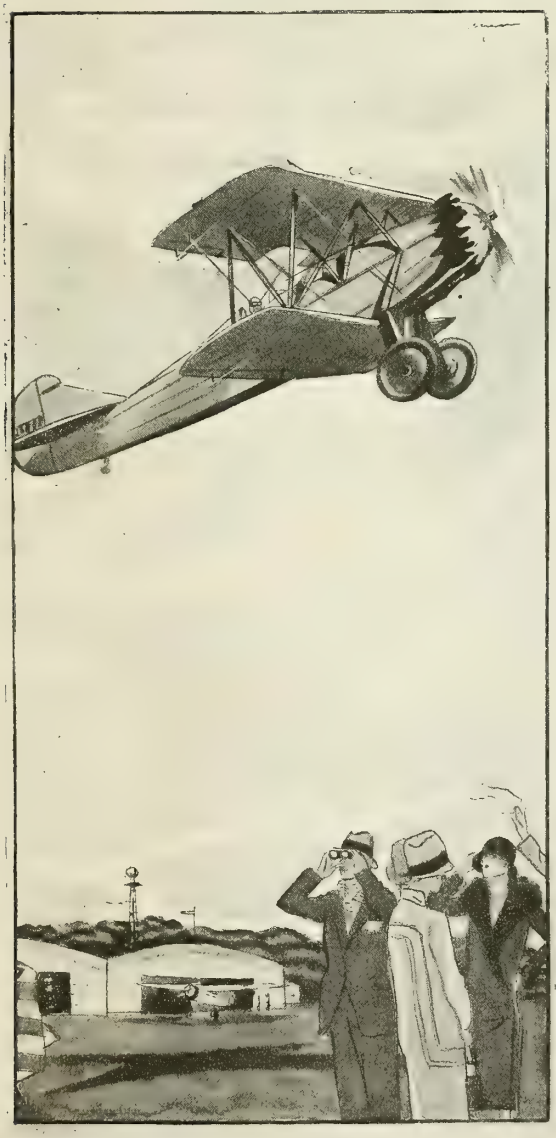
LIQUID MARINE GLUES

LIQUID marine glues are divided into the drying and the non-drying types. The drying glue does not harden but dries on the surface, the body of the glue which is protected from the air retaining its resiliency indefinitely. The non-drying glue loses some of its stickiness when exposed to the air but never becomes dry.

Non-drying glue has no adhesive strength, and when it is placed between two pieces of wood they are easily pulled apart, the glue adhering to both pieces and forming in long strings. This type of glue is used in places where planks will weave and work together and where there is a great amount of expansion and contraction, and is especially valuable when used between double-planking and on battens.

Marine glue of the drying type is used for a waterstop where a good adhesive is required in addition to resiliency, and must withstand expansion and contraction caused by weather conditions.

COMFORT, COST, CONFIDENCE SET NEW TRAFFIC MARK!



THREE million men, women, and children took to the air last year. Between July and December traffic sped over America for 78,940,161 swift, straight miles. Planes today are carrying more first-flighters and developing more seasoned air travelers than ever before.

Some weeks ago, the American Society for Promotion of Aviation offered first flights at $1 a ride. With little advertising, 5,182 mothers, fathers, and youngsters showed that they're not only unafraid to fly, but are anxious to go up behind Wright "Whirlwinds" and "Cyclones." Comfortable weather helped get them up, and price also played a part.

But the thing which counted most of all is the public's growing confidence. Sturdy planes, powered by Wright and piloted by capable men, daily carry new crowds aloft. Comfort, cost, and confidence are setting new traffic records.

To the masses "Powered by Wright" means confidence in Flying. Dependable performance of Wright's five world-proved engines makes the phrase an asset not only to Wright . . . and to Aviation . . . but to each of the 4,000,000 who've already flown, and to countless others who'll soon be taking their first trips up!

WRIGHT AIRCRAFT ENGINES

WRIGHT

AERONAUTICAL CORPORATION

PATERSON, NEW JERSEY

DIVISION OF CURTISS-WRIGHT CORPORATION

WRIGHT AIRCRAFT ENGINES

RECENT AIRCRAFT PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C., at the rate of twenty cents each. State number of patents and name of inventor when ordering.

Metal fuselage for body. Edmund B. Cairns, New York, N. Y.; assignor to Cairns Development Co., Washington, Del. (1,749,757)

Airplane-wing connection. Corydon M. Johnson, Farmingdale, N. Y.; assignor to Fairchild Airplane Manfacturing Corporation, New York, N. Y. (No. 1,749,769)

Airplane appliance. Richard E. S. Toomey and James C. Evans, Miami, Fla. (No. 1,749,858)

Structural design for aircraft. Henry F. Lake, Viroqua, Wis. (No. 1,749,951)

Airplane. Harold J. Read, San Diego, Cal. (No. 1,749,959)

Safety parachute. Frank Arnaiz, Los Angeles, Cal. (No. 1,749,965)

Surface-control mechanism for airplanes. Frank A. Canney, Seattle, Wash.; assignor to Being Airplane Company, Seattle. (No. 1,750,089)

Helicopter airplane with a plurality of propellers. Jakob Hojnowski, Nekoosa, Wis. (No. 1,750,108)

Airship fins and stabilization. Ralph H. Upson, Detroit, Mich.; assignor to Aircraft Development Corporation, Detroit. (No. 1,750,141)

Propelling device. Westinus Boer, Groton, Conn. (No. 1,750,382)

Composition of matter and emthod of employing the same (rendering balloon fabric impermeable to inflating gas). Clarence M. Carson, Akron, Ohio; assignor to Goodyear Tire and Rubber Co., Akron. (No. 1,750,460)

Aeroplane. Edward H. Lanier, Miami, Fla. (No. 1,750,529)

Skeleton structure such as aircraft-fuselage. Frederick Sigrist, Oxshott, and Sydney Camm, Long Ditton, England. (No. 1,750,692)

Propelling means for dirigible airships. Jesse W. Silver, Tacoma, Wash. (No. 1,750,765)

Electrical heating means for aeroplane-wings to prevent accumulation of ice and snow. William S. Ingram, Philadelphia, Pa. (No. 1,750,777)

Means for controlling the angle of incidence of aero revolving blades or wings and propellers. David Kay, Blackford, Scotland. (No. 1,750,778)

Art of making metal fabrics. Edmund B. Cairns, New York, N. Y.; assignor to Cairns Development Co., Wilmington, Del. (No. 1,750,831)

Wing construction for aircraft. Edmund B. Cairns, New York, N. Y.; assignor to Cairns Development Co., Wilmington, Del. (No. 1,750,832)

Tubular member. Edmund B. Cairns, New York, N. Y.; assignor to Cairns Development Co., Wilmington, Del. (No. 1,750,833)

Metal fuselage. Edmund B. Cairns, New York, N. Y.; assignor to Cairns Development Co., Wilmington, Del. (No. 1,750,834)

Aircraft. James Tantillo, Glendale, Cal. (No. 1,750,911)

Supercharging method for internal-combustion engines. Gabriel Becker, Charlottenburg, Germany. (No. 1,750,919)

Emergency wheel for aeroplanes. Lewis H. Baldwin, Oklahoma City, Okla. (No. 1,750,950)

Mooring for airships. Francis H. Clergue, Montreal, P. Q. (No. 1,751,543)

Laterally-stable air-vehicle. David R. Davis, Los Angeles, Cal. (No. 1,751,622)

Aircraft. Elwood H. Herbig, Great Neck, N. Y.; assignor to Chance M. Vought, Great Neck, N. Y. (No. 1,751,631)

Dock for flying-machines. Hugo Junkers, Dessau, Germany. (No. 1,751,639)

Hangar equipment. Carl Bellmann, New York, N. Y. (No. 1,751,721)

Propelling means for airships. Frank G. Landwehr, Detroit, Mich. (No. 1,751,824)

Machine for aerial navigation. Benjamin F. Seymour, Washington, D. C. (No. 1,751,890)

Airplane-wing construction. Tom Towle, Detroit, Mich.; assignor to Towle Aircraft Co., Detroit. (No. 1,751,937)

Aeroplane. George Y. Lauchin, Milwaukee, (No. 1,752,012)

Aeroplane-rudder-bar control. James C Spencer, Chicago, Ill. (No. 1,752,118)

Balancing system for aircraft. John P. Tarbox, Philadelphia, Pa.; assignor to Tarbox Safety Aircraft Co., Wilmington, Del. (No. 1,752,119)

Airplane-wing section. Lew W. Gobble, Grand Junction, Colo. (No. 1,752,378)

Landing-gear. Holden C. Richardson, Washington, D. C. (No. 1,752,395)

Stabilizer for aeroplanes. Fred Rumford, Jetmore, Kans., and Harold T. Henry, New York, N. Y. (No. 1,752,396)

Ski-pedestal for aeroplanes. Silas A. Cheesman, Winnipeg, Manitoba; assignor to Northern Aerial Minerals Exploration, Ltd., Toronto, Ont. (No. 1,752,416)

Aeroplane-wing construction. Walter M. Cross, Kansas City, Mo. (No. 1,752,421)

Take-off and landing device for aeroplanes. Wilford B. Gerbracht, Ames, Iowa. (No. 1,752,554)

Aircraft-covering. Isadore M. Jacobsohn, Chicago, Ill., and Starr Truscott, Birmingham, Ohio. (No. 1,752,637)

Airfoil construction. Harry H. Semmes, Chevy Chase, Md.; assignor to Bendix Aviation Corporation, New York, N. Y. (No. 1,752,701)

Airship construction. Victor A. M. E. Brahy, St. Hillaire, P. Q. (No. 1,752,831)

Flying boat. Ernest Zindel, Dessau, Germany; assignor to Hugo Junkers, Dessau, Germany. (No. 1,752,874)

Floating dock for water aircraft. Paul Degn, Kiel-Dietrichsdorf, Germany. (No. 1,752,894)

Hangar for airships. Otto Krell, Berlin-Dahlem, Germany. (No. 1,752,911)

Airship. Hugh J. Ross, Cliffwood, N. J. (No. 1,753,068)

Aeroplane-wing. Charles W. Vincent, Kingston, Pa. (No. 1,753,075)

Airplane. George R. Engledow, Raton, N. Mex. (No. 1,753,112)

Aeroplane-wing heater. James A. Kidd, St. Petersburg, Va. (No. 1,753,433)

Aerodrome. William A. Loth, Paris, France; assignor to Societe Industrielle des Procedes W. A. Loth, Paris, France. (No. 1,753,574)

Airship-terminal. Gilbert Betancourt, Detroit, Mich.; assignor to Aircraft Development Corporation, Detroit. (No. 1,753,592)

Tandem-wheeled aircraft. Florian F. Manor, Oshkosh, Wis. (No. 1,753,612)

Retractable landing-gear. Daniel J. Brimm Jr., West Hemstead, N. Y.; assignor to Ireland Aircraft, Inc. (No. 1,753,770)

Metal envelope for aircraft-planes. Claudius Dornier, Friedrichshafen-on-the-Bodensee, Germany; assignor of one-half to the Form: Dornier Metallbauten Gesellschaft mit beschrankter Haftung, Friedrichshafen, Germany. (No. 1,753,823)

Aeroplane. Charles Petrunin, Toledo, Ohio. (No. 1,753,938)

Aircraft. Austin G. Boldridge, Houston, Tex. (No. 1, 754,007)

Means for operating aircraft-lights. Samuel D. Wiley, Metuchen, N. J. (No. 1,754,134)

Multipower-plant transmission for aircraft and the like. John D. Van Vliet, San Francisco, Cal. (No. 1,754,192)

Aircraft. George W. Hardin, Greeneville, Tenn. (No. 1,754,211)

Hydro-airplane. James R. Browne, Evanston, Ind. (No. 1,754,220).

Aeroplane. Isidor Neustatter, Tucson, Ariz. (No. 1,754,397).

Dolly. Lloyd Stearman, Wichita, Kans.; assignor to Stearman Aircraft Company, Wichita. (No. 1,754,407).

Aeroplane. Tubal C. Ryan, San Diego, Calif. (No. 1,754,529).

Aeroplane. Henry Podolsky, San Francisco, Calif. (No. 1,754,571).

Aeroplane. Isaac E. Hanson, Oklahoma City, Okla. (No. 1,754,715).

Supercharger construction. George J. Mead, Hartford, Conn.; assignor to Pratt and Whitney Aircraft Company, Hartford, Conn. (No. 1,754,724).

Aeroplane glider fuselage. Lester N. Yohe, New Oxford, Pa. (No. 1,754,733).

Aeroplane. William E. Burks, Kerrville, Tex. (No. 1,754,737).

Aircraft. Isaac Covino, West New York, N. J. (No. 1,754,817).

Bulkhead for airships. Wilhelm Siegel, Friedrichshafen, Germany; assignor to Goodyear-Zeppelin Corporation, Akron, Ohio. (No. 1,754,866).

Airship. Wilhelm E. Door, Friedrichshafen, Germany; assignor to Lufschiffbau Zeppelin Gesellschaft mit beschrankter Haftung, Friedrichshafen, Germany. (No. 1,754,883).



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For further facts, write to Goodyear—Aeronautics Department, Akron, Ohio, or Los Angeles, California. Goodyear Airwheels are now made for planes weighing from 1,000 to 20,000 pounds.

GOODYEAR

EVERYTHING IN RUBBER FOR THE AIRPLANE

SIEMENS-HALSKE 560-HORSEPOWER RADIAL ENGINE

By

Edwin P. A. Heinze

THE Siemens-Halske company of Berlin has produced a new aircraft engine which is one of the largest radial air-cooled power plants ever built. This engine, which is designated SH 20, has passed the official approval tests which were conducted not only in accordance with German but also United States and CINA regulations.

The engine has nine cylinders of 6.06 inches bore and a stroke of 7.4 inches, giving a total displacement of 1,922 cubic inches. The compression ratio is 5.6-to-1, and the full power output in horizontal flight near the ground is 540 horsepower, which may be maintained safely for one hour. The maximum speed is 1,800 revolutions per minute. Normal power during flight at cruising speed is 450 horsepower at 1,690 revolutions per minute. This may be increased to 485 horsepower at 1,740 revolutions per minute and maintained for three hours.

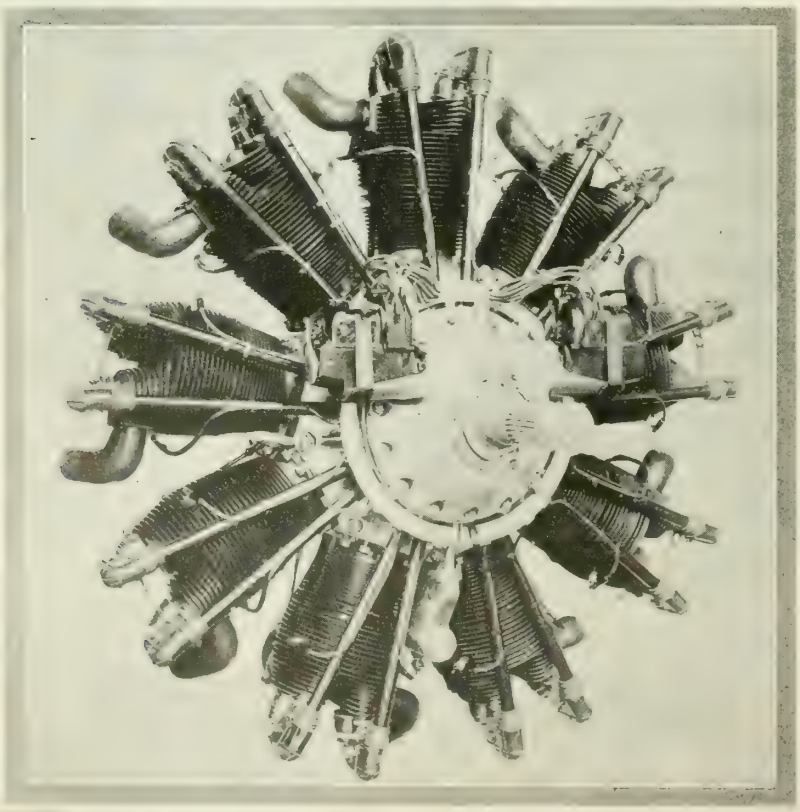
A feature of this engine is the manner in which the cylinder heads are fixed on the barrels. Both parts are for some distance of their length provided with a conical seating, as well as a thread, and the head is heated and screwed down tight, one of the cooling flanges being employed as a counter nut. A firm union of both parts, hardly discernable from outside, is thus obtained. The manufacturer claims that this manner of fastening offers less resistance to heat dissipation than others.

Each cylinder is provided with only two valves and has two spark plugs. The crankshaft consists of two parts, the front part being of one piece with the crankpin. It runs in two large roller bearings on each side of the crank and a double cask-roller bearing at the propeller end. The two crankshaft parts are rigidly united, and provision is made to insure their being correctly reassembled after an overhaul. Although this motor has no reduction gear, an engine provided with one is now undergoing approval tests; in the latter model the third crankshaft bearing consists of a ball bearing located in the front crankcase cover, whereas the propeller shaft again has a double cask-roller bearing, which takes up all stresses imposed by the propeller. In the motor with the reduction gear the propeller revolves at half the engine speed.

The cam drum is mounted concentrically with the crankshaft, off which it is driven by double gears. The pushrods are not compensated, because of a special arrangement of the cams. The valve stems are bored hollow. Two magnetos are driven by a transverse shaft on the forward cover situated above the crankshaft and between the forward main and propeller bearings; i.e., at a point least subjected to torsional vibration. The rear part of the crankshaft has a short stump only, on which is mounted the gas distribution disk. An extension shaft is employed to transmit the power to five auxiliary drives carried by the rear cover, which, in addition, carries the compressed air distributor and a double lubrication pump for fresh and return oil. The oil pump forces fresh oil into the hollow crankshaft from where it is conducted to all surfaces requiring lubrication.

The first magneto has a spark advance of 32 degrees; the second, of 34 degrees. The inlet valves open 10 degrees before upper dead center is reached, and close 50 degrees after lower dead center. The exhaust valves open 58 degrees before lower dead center and two degrees after top dead center. The valve clearance when the engine is cold is 0.0039 inch. A Zenith 75 DJ 656 carburetor, with altitude correction and economical jet, is employed. The fuel consumption is given as 0.48 to 0.53 pounds per horsepower hour. The lubrication pressure is said to range from 42 to 50 pounds per square inch. The largest diameter of the engine is 57.4 inches and the overall length 46.5 inches. In front of the fastening flange the engine has a length of 24.7 inches and behind of 21.8 inches. The weight is given as 882 pounds so that the power load is approximately 1.65 pounds per horsepower. The average torque of the motor is 1,482 pounds.

During the approval tests this engine, which had previously run altogether approximately 80 hours, attained a maximum output of 600 horsepower at 1,900 r.p.m.



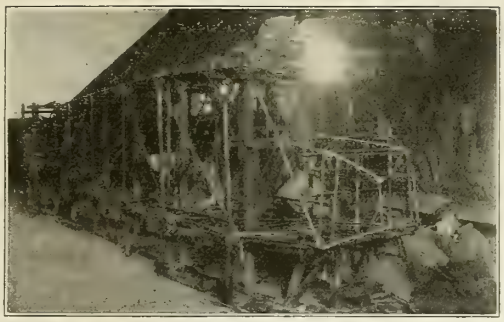
Propeller end view of the Siemens-Halske 560-horsepower radial engine

G. E. CARD COMPASS

THE General Electric Company has designed a direct-reading card compass for aircraft for use where the remote indicating type is not essential. The new card compass is well adapted for use with small aircraft because of its light weight.

Its design embodies a spherical aluminum bowl filled with a liquid and containing a graduated dial card mounted on a jewel pivot. The compensating scheme used to correct for local magnetic disturbances consists of an adjustable magnetic mechanism which eliminates the old arrangement of needles in a drawer. It is positive in adjustment, convenient to handle and well suited to general requirements.

A ground glass lens is provided in front for reading the position of the card with respect to a fixed "lubber line," and two expansion chambers at the top allow for changes in volume of the liquid in the bowl, caused by temperature and altitude variations. An electric light is placed between these two chambers to illuminate the front edge of the card. The intensity of this light can be varied by the pilot, and the socket is so located that he can conveniently change lamps in flight should the necessity arise. This illumination feature is standard but can be omitted if desired. Its parts are readily detachable in the field.



Jig around which is built the strong steel framework of the Stinson fuselage. This fuselage is welded practically as a unit of great strength.

STINSON

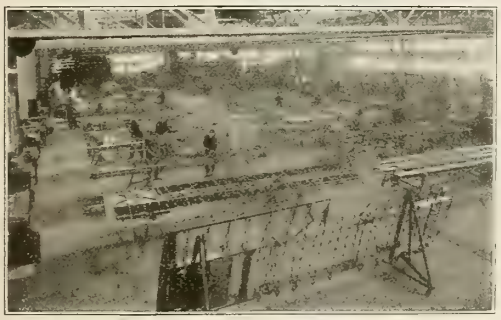
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In this modern shop, a part of the Stinson plant, the small metal parts are made and finished with micrometer accuracy.



Part of the metal working department, where the gas tank, cabin panels, doors, cowling and sheathing are produced.



Here Stinson wings are carefully built by hand. Stages show from beginning to point of covering and assembling.

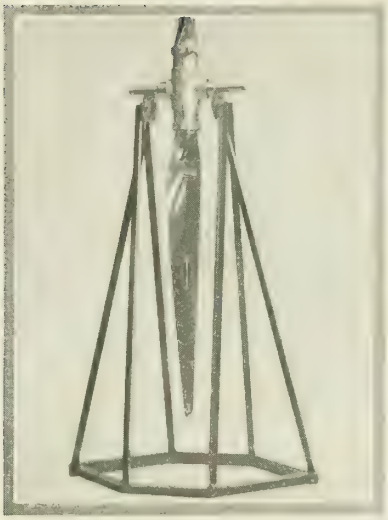
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Stinson Airliner—10-Pass. Tri-Motored Transport—$23,900 • Prices F. O. F. Wayne, Mich. Equipment other than standard, extra

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PROPELLER BALANCING EQUIPMENT

THE Fogg propeller balancing and pitch setting equipment is designed to facilitate the servicing of propellers by an airplane mechanic without special training, and to increase the efficiency of aircraft engines by keeping the propellers properly adjusted with a minimum of time and cost of operation. This apparatus is manufactured by the Markem Machine Company, of Keene, N. H., and is distributed by the N. H. Aviation and Marine Company of Concord, N. H.

The Fogg propeller adjusting apparatus occupies a small amount of space and there are no small parts which may be lost. According to the N. H. Aviation Company, the use of this equipment to adjust propellers eliminates engine vibration, reduces wear on bearings, results in more hours between overhauls, gives a better engine performance with less fuel consumption and will increase the maximum performance of any ship.

The equipment includes a pitch setting bench, protractor, surface gauge, balancing stand, three mandrels, one accommodating an OX, Warner or Kinner power plant, one accommodating a Hispano A. I. E. or Wright J-5, and one a Wright J-6 or Wasp A B and C direct drive. Additional mandrels to accommodate any aircraft power plant may be obtained..

The surface plate of the apparatus is a ribbed casting accurately machined, with station lines placed at six-inch intervals. The propellers may be adjusted to various heights by the use of any mandrel holder, the protractor being a precision instrument with which blade angles can be set within very close limits. Tracking is accomplished by means of a surface gauge. The balancing stand of the apparatus is made of angle iron and is provided with a cast iron base and ball bearing rollers which do not require accurate leveling. A manual on the care and adjustment of propellers is furnished with the apparatus.



The Fogg pitch setting bench with protractor and gauge

ARENS CONTROL

THE Arens Control Unit, produced by Wilson Steel Products Co., provides a positive push and pull movement for throttle, choke, spark, starter, etc. It is especially useful on aircraft where safety, low weight and simplicity of installation are paramount requisites.

In principle, this control employs a closely wound spring for compression and a flexible cable for tension. The spring has no tensile strength, but it carries compression loads; the cable, though possessing no compression strength, is arranged to carry the tensile loads. The combination of these two basic features results in an element that will take bends at small radii, as required in controls.

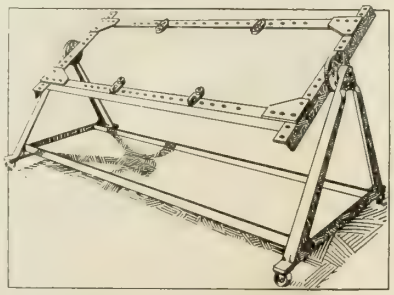
This element can be used in several types of casings—a brass tube which is rigid (which must be bent for the installation) and a flexible spring casing made of flat wire. By the use of this flat wire spring, the casing has flexibility and tensile strength, with a small outside diameter. This type of control can be used in places where it would be impractical to install the conventional type of control. It can be terminated with knobs as on standard choke wires, with a straight sliding rod that can be threaded for clevis, or it may be bent at an angle to connect with a lever. The flat wire casing is of oil-tempered wire that has been drawn through hot tin for rust preventive; the inner element is saturated with oil for lubrication and resisting rust.

The control is made in various diameters, ⅛ inch, 3/16 inch, ¼ inch, etc., these dimensions being the size of the sliding element. The flexible control can be made in any desired length.

This control is the invention of Charles A. Arens, whose wide experience in the aircraft industry covers many years; he has constructed and flown aircraft of his own design, and has been connected with many of the largest builders of airplanes before and during the war. The control unit has been developed from Mr. Arens' practical knowledge and mechanical experience in the aeronautical field, which is equalled by few of the pioneers in the industry.

UNIVERSAL AIRPLANE ENGINE STAND

THE Universal Airplane Motor Stand, distributed by the American Airport Equipment Company, of Chicago, Ill., is designed to accommodate all aircraft engines of the radial, in-line and Vee type up to 600 horsepower. The width and length of the stand may be adjusted. The apparatus is mounted on roller bearing casters. An Oil drip pan is provided to prevent fires



and keep the floor clean. The equipment includes two plates 30 by 4 by ¼ inches to accommodate radial engines which do not supply mounting plates.

The recommended load of the Universal Airplane Motor Stand is 1,200 pounds and the factor of safety is three. The maximum length is sixty inches; maximum width, twenty-eight inches; minimum width, nine inches; and the swinging radius is thirty inches. The weight of the stand crated is 220 pounds.

WIND TUNNEL TESTS WITH A SERIES OF PROPELLERS OF DIFFERENT DIAMETERS ON A SINGLE FUSELAGE

AERODYNAMIC tests were made with four geometrically similar metal propellers of different diameters, on a Wright Whirlwind J-5 engine on an open-cockpit fuselage. The tests were made in the twenty-foot Propeller Research Tunnel of the National Advisory Committee for Aeronautics, and are described in N.A.C.A. Report 339 by Fred E. Weick. The results show little difference in the characteristics of the various propellers, the only one of any importance being an increase of efficiency of the order of one per cent for a five per cent increase of diameter, within the range of the tests.

Report 339 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.


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DIGEST OF FOREIGN TECHNICAL ARTICLES RELATING TO AERONAUTICS

By

Elsa Gardner

Critical Velocity of Propeller Shaft

The Critical Velocity of the Shaft of a Driving Propeller (La velocita critica degli albero portaslica), P. E. Brunelli, Notiziario di Aeronautica, Vol. 6, No. 3, March, 1930, pp. 219-229, 4 figs., 2 tables.

TWO methods of determining the critical velocity of propeller shafts are developed, the first being applicable to the calculation of the critical velocity of ship-propeller shafts and shafts for some types of dirigible propellers. The second scheme considers the conditions of the propeller shaft of an airplane and takes into account the torque exerted by the propeller on the shaft.

Oil Engines for Airplanes

High-Speed Two-Stroke Oil Engines, P. E. Biggar. Automobile Engineer, Vol. 20, No. 266, April, 1930, pp. 121-125, 10 figs., 2 tables.

SPECIAL features of high-speed two-stroke oil engines and their possibilities for aircraft are discussed. The engine defined is capable of running on a non-volatile fuel of at least 0.85 specific gravity at 900 r.p.m. normal speed. The cylinder size would be of from one to eight liter capacity, the fuel being injected mechanically and ignited by compression, ignition with or without the assistance of a hot surface. Much of the discussion also applies to the low-compression oil engine of the spark-ignition type.

This class of engine, with comparatively high pulling power and moderate speed, is very applicable to airplanes, in the author's estimation. It is usually rated at an output of from 75 to 90 pounds per square inch b.m.e.p (on the two-stroke cycle). Its performance is compared with those of the four-stroke gasoline and the four-stroke oil engine.

The form of port opening diagram required and the most suitable design of valve gear are considered, the more important variables being analyzed mathematically. Existing types of engines are classified according to the arrangement and method of operating their ports. Scavenging air supply and scavenging pump design are also taken up.

The Junkers Heavy-Oil Aero Engine. Engineering, Vol. 129, No. 3352, April 11, 1930, pp. 471-473, 12 figs. on supplementary sheets.

THE development of the Junkers heavy-oil engine for airplanes, beginning with 1914, is traced with details of the investigations required. The chief difficulties were caused by the high combustion pressures and by the necessity of injecting and atomizing the fuel at those pressures in the shortest possible time. Reference is made to the detailed researches undertaken on two special single-cylinder engines to solve problems connected with operation and weight.

The cylinders of the recent model are provided with inlet ports for scavenging air at the lower end and with exhaust ports at the upper end so that fresh air passes upwards with turbulent motion. Each cylinder is fitted with four fuel nozzles, with pumps arranged directly in front of admission ports. The fuel is injected in a finely atomized condition directly into the hot central core of the combustion air without coming into contact with the cool walls. The crankshaft speed at 700 horsepower is 1600 r.p.m and the weight complete 1,852 pounds.

An article by R. Schulz in the March, 1930, issue of *Aircraft Engineer* (Vol. 2, No. 13, pp. 62-63, 6 figs.), outlines briefly the construction and operation of the Junkers S1-1 compression-ignition oil engine.

Properties of Aviation Metals

Dependence of Aviation on Metallurgy, J. B. Johnson. Metals and Alloys, Vol. 1, No. 10, April, 1930, pp. 450-454, 3 figs., 3 tables.

THE physical properties required in metals employed in building airplanes and engines are described, with an explanation of the various tests required of these materials.

The author remarks that the compression loads are usually the critical ones in the fuselage and wing framework and, therefore, it is important to secure material with a uniform modulus of elasticity for long columns and a high yield point in compression for short columns.

The importance of bending properties, especially for sheets, is emphasized and a combination of tensile and bend test is recommended as preferable to any ductility test made by cupping.

The rejection of steel forgings because of hairlines is discussed. The effect of grooves on chrome-molybdenum steel tubing when heat treated is shown. The satisfactory properties secured by heat treating this steel are pointed out, with the recommendation that wing beams and structural parts subject to vibration should be drawn at a temperature of not less than 800 degrees Fahrenheit.

Tables show the percentage weight of major assemblies to total weight of structure without the engine, and the chemical analysis, physical properties, and uses of ferrous and copper and nickel-base nonferrous metals.

Engine Indicator

On the Possibility of Applying the Cathode-Ray Oscillograph to the Indicator for High-Speed Engines, Juichi Obata and Yukio Munetomo. Tokio Imperial University, Aeronautical Research Institute—Report No. 57, February, 1930, pp. 93-100, 5 figs.

RESULTS are discussed of an investigation which was undertaken to employ the cathode-ray oscillograph in place of the usual Duddell oscillograph in the electrical indicator for high-speed internal-combustion engines, described in a previous paper. It was found that the Johnson-type cathode-ray oscillagraph may be employed with some modifications of the electrical arrangement, a special device being introduced to indicate the piston position. Photographic record of the indicator diagram can be obtained for those engines for which the point-to-point indicator such as the R.A.E. indicator (or Farnborough type) gives satisfactory results. The novel feature of the present arrangement lies in its absolute lack of inertia.

Engine Torque Measurement

Application of the Inverse Wiedemann Effect to Torque Measurements and to Torque Variation Recordings, Tatuo Kobayasi.. Tokio Imperial University, Aeronautical Research Institute—Reports Nos. 52 and 54, November, 1929, and January, 1930, pp. 425-445 and pp. 1-4, 34 figs.

A METHOD of recording the variation of torque acting on a rotating shaft by application of the inverse Wiedemann effect is described in the first report. A longitudinal direct current was passed through part of the shaft, the magnetization varying as the torque varied, and the magnetic variation was recorded by an oscillograph. Since this arrangement was found suitable for recording only quick variations of torque, an alternating current was sent through the shaft for recording slow variations of torque. A certain wave form was induced in the coil of which the amplitude changed as the torque changed. It was necessary for the number of cycles of the longitudinal current to be much greater than the frequency of the torque variation—at least ten times.

Records of the variations of torque on a shaft rotated by a six-cylinder automobile engine, sending a 600-cycle alternating current through the shaft, are discussed in the second report.

Engine Cowling

The Resistance of Engines, H. C. H. Townend. Aircraft Engineer, Vol. 2, No. 14, April, 1930, pp. 83-89, 14 figs.

THE evolution of the airfoil-section ring applied to radial air-cooled airplane engines for reducing the air resistance is described, with suggestions for the ring's wider use. An explanation of the ring's action is given in detail and particulars of tests on larger models are outlined.

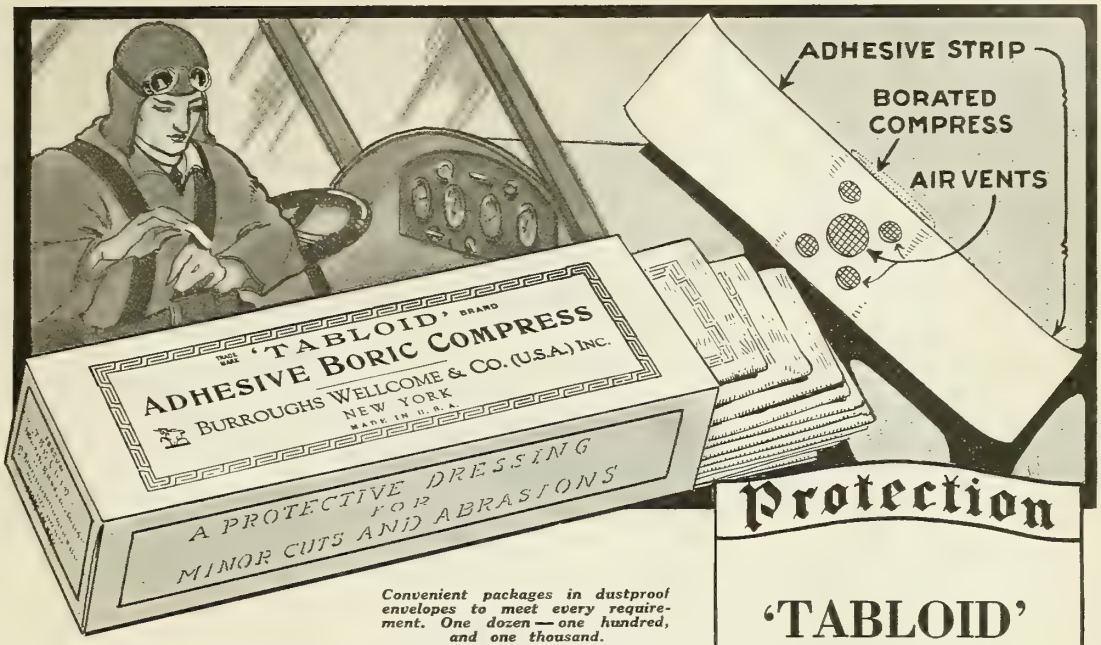
Results show that the thin cambered plate sections generally give the best reduction in drag. If the ring is required also to collect the exhaust gases or silence the engine, a pretty good reduction can be obtained with a thick symmetrical section. The reduction increases steadily with increase of chord up to 12 to 14 inches. Best results were obtained with a camber of 0.09 to 0.10 chord. It is probable that the best results will be obtained when the rear edge of the ring is cut away to fit around the valve rockers.

Engine Fuels

Fuels and Dopes for Aircraft Engines, A. E. Dunstan and F. B. Thole. Royal Aeronautical Society—Journal, Vol. 34, No. 232, April, 1930, pp. 329-335 and (discussion) pp. 336-343.

THE necessity for close coöperation and collaboration between the producer of the fuel and the engine designer who will

(Continued on following page)



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(*Continued from preceding page*)
make use of the fuel is emphasized. The criteria that the designer and user of the aero engine demand for aviation spirit are taken up, including volatility, physical and chemical stability, and anti-knock quality.

The authors remark that cracked spirit, produced by a variety of modern processes from heavy petroleum residues, has a relatively high anti-knock value, depending upon the cracking stock used, the temperature of cracking, and the nature of the refining process. They expect to find it used as an aviation spirit as soon as the authorities are satisfied as to its keeping qualities. Various methods of evaluating anti-knock quality are criticized.

Art of Flying

The Art of Flying Landplanes and Seaplanes, N. Macmillan. Royal Aeronautical Society—Journal, Vol. 34, No. 232, April, 1930, pp. 305-318, and (discussion) pp. 318-328, 6 figs.

SIX diagrams are developed to give a pictorial conception of what an airplane can accomplish in flight, five of them showing instantly the distinct difference between the geometry to which the pilot flies with instruments against that to which the technician and salesman refer on paper. All the factors affecting take-off are discussed in detail, and recovery from normal and inverted spin is explained, as well as methods of handling the plane in alighting. The author remarks that, although not generally realized, a horizonless aspect of flight is very important in the early stages of ground flight.

Coöperation between test pilot and designer is urged. Two novel points which appear important as landing speeds increase in an endeavor to obtain higher top speeds are: The fact that with certain combinations of airscrew-blade section, pitch and speed of revolution, the shortest possible take-off cannot be obtained by opening the throttle fully at the beginning of take-off, and that a fast skimming approach may enable slower contact to be made than by an approach at slow gliding speed.

Automatic Airplane Control

A Three-Phase Automatic Pilot, W. C. A. Beck. Aircraft Engineer, Vol. 2, No. 14, April, 1930, pp. 80-81, 6 figs.

A GYROSCOPICALLY controlled servo-operated mechanism for maintaining an airplane in level flight and on a set course is explained in detail. The author states that the automatic pilot must feel the angular changes of the airplane, keeping the amount of elevation to a minimum, and that this sensitive piloting is claimed to have been achieved by the Boykow inertia frame.

Two gyroscopes are mounted in one frame, each having freedom of precession in one plane only, and are driven by 333-cycle three-phase current, rotating in opposite directions at a speed of 20,000 r.p.m. The axes of precession of the gyroscope housings are so connected that the gyroscope can accomplish precession only when precessions oppose each other. The effects of the speed indicator and other instruments are all transmitted through the inertia frame in order that it alone may control the servo motor.

Bird Flight

The Flight of Birds and Balancing (Le vol des oiseaux et le balancement), H. de Koenigswarter. Aeronautique, Vol. 12, No. 129, February, 1930, Aérotechnique supplement), pp. 55-60, 11 figs.

THE motions of birds in flight are analyzed according to known principles of mechanics. It is explained by what mechanism the balancing of the bird is obtained. The possibility of a displacement of the center of gravity by bearing at the point of application of the resultant of the pressure of air under the wings is discussed. From one side of the center of gravity the point of application of the resultant of the weight is considered and from another side the point of application of the reactions of the air, the two points being of different trajectories.

Water-Cooled Engine Progress

Water-Cooled Aero Engines—A Review of Six Years' Progress, A. J. Rowledge. Automobile Engineer, Vol. 20, No. 266, April, 1930, pp. 139-143, 9 figs.

THE reliability, costs and performances attained by water-cooled airplane engines are outlined with forecasts of future designs. The author believes that the next six years should show considerable swing of opinion towards the water-cooled type. He gives evidence to show that development will be in the direction of relative reduction in cylinder capacity on a given crank, with high mean effective pressures and rate of crankshaft revolutions. The 1,000-brake-horsepower unit may soon be in demand.

The author would like to see more attention paid to the adoption of three-bladed airscrews with a view to improving the smoothness of working. If a variation of gear ratios is needed to retain a high efficiency, he thinks it well worth while.

General adoption of evaporative cooling is predicted. The effect of variable-pitch airscrews on engine design, superchargers, the Rolls-Royce expanding air intake, and fuel progress are commented upon. Tests of the Rolls-Royce R engine are discussed and the steady improvements in engine materials are commended.

Shock Absorber Tests

Impact Tests of Compression Rubber Shock Absorbers for Airplane Undercarriages (Stossversuche an Druckgummifederungen für Flugzeugfahrgestelle), K. Hohenemser. Vol. 21, No. 6, March 28, 1930, pp. 133-137, 15 figs.

IT IS established that compression rubber during deformation adheres to the pressure area. This points the way to a constructive simplification of compression rubber design. The hysteresis phenomenon is reduced by the outer and inner frictional force. A dropping device is described by means of which the model shock absorber was examined during compression of the rubber. The impact forces uniformly agree up to one factor with the forces of the compression tests. The time factor depends upon the mean deformation speed. When deformation speed comes up in practice, the impact force becomes 1.1 to 1.2 times as large as the forces of the static compression tests. In conclusion an example is shown, the assumption of which have no effect over the pressure per unit area and over the maximum percentage of compression into that volume or the weight of the rubber shock absorber.

Soaring Flight

Technical Report of the Rhone Soaring Flight Competition in 1929 (Technischer Bericht des Rhön-Segelflug-Wettbewerbs 1929), A. Lippisch. Zeit. für Flugtechnik und Motorluftschiffahrt, Vol. 21, No. 4, February 28, 1930, pp. 92-98, 19 figs., 1 table.

FORMULAS derived for the calculation of the performance of the soaring planes are first discussed, followed by technical details of the most noteworthy of the 26 planes entered in the Rhone Competition.

The victorious high-wing *Vienna*, constructed by Krönfeld, is a further development of the *Professor* type R.R.G. tried out the previous year. This design of a high-efficiency glider denotes substantial improvement of aspect ratio and this would climb up to 20. With the same area as the *Professor*, the machine has a span of 19.1 m. The wing is in two parts, the middle part having a stronger convex profile developed from the Göttingen 549 airfoil. The tips of the wing are greatly tapered and the wing section is of less convexity and thickness in order to attain a favorable aileron operation. The wing is of mono-spar construction, with the local loads taken by a light rear spar. The strut connection on the main spar was eccentrically developed to ease the compression belt of the inner area. The strut is a V, as in the *Professor*. The fuselage has an eggshaped cross-section and in profile has the hook nose of the *Professor*. The use of differential ailerons contributed much to the flying of the plane.

Airplane Propulsion

The Propulsion by Reaction (La Propulsion par reaction), M. Roy. Technique Aéronautique, Vol. 21, No. 99, January 15 1930 pp. 9-20 4 figs.

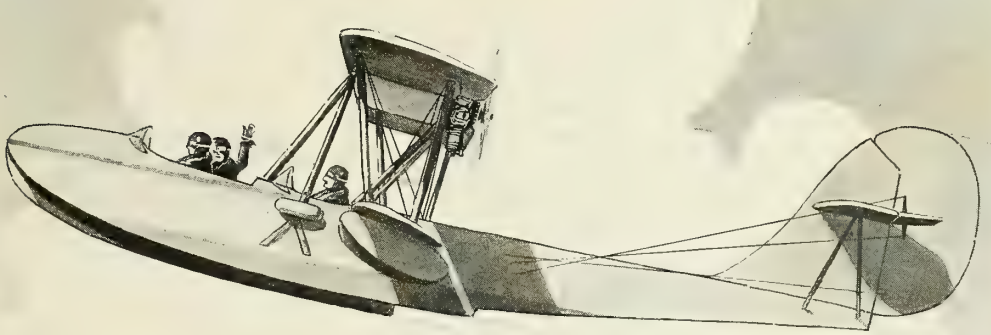
PYROTECHNICAL rockets and the reaction wheel are given by the author as examples in defining propulsion by reaction. One diagram is used from which a number of systems of motor-propulsion for airplanes are considered from the point of view of their efficiency of propulsion. In this diagram, the thermodynamic evolution is produced in part by a heat engine and in part by a turning system or turbine which actuates a propeller. The turbine has orifices placed at the rear and perpendicular to their absolute trajectory, which is helicoidal.

For considering the standard engine and propeller group, the turbine is reduced to a simple transmission. For obtaining propulsion by rocket, the turbine is immobile and the propeller non-existent. For obtaining an explosive rocket without external air consumption, the air passages are eliminated. For obtaining propulsion by pure reaction, the engine is abolished and compression effected in the hollow blades of the propeller.

It is found that this last type of propulsion gives a compression very inferior to that of the normal aviation engine.

Paper presented before the Ste. Fse. de Navigation Aerienne.

ANNOUNCING



THE WHITTELSEY "AMPHIB"

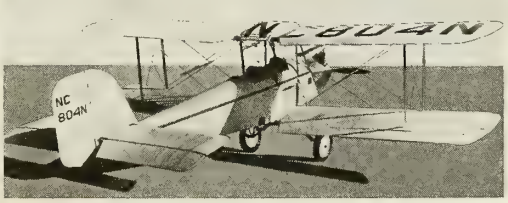
THE Whittelsey Manufacturing Co., American manufacturers of the world-famous *Avian,* have just acquired all the capital stock and assets of the Taft Airplane Corporation, builders of the Kingfisher Flying Boat.

With the addition of amphibion gear and a few refinements, this new plane will be produced at the Whittelsey plant with the skill and precision characteristic of the Whittelsey organization and will be sold under the trade name Whittelsey *Amphib.*

The Whittelsey *Amphib,* powered with a 165 h.p. motor, is a 3-place, open cockpit, pusher type amphibion of sturdy wooden hull construction. It will be available also as a 4-place flying boat. A series of tests and more than 100 flying hours have demonstrated its aero- and hydrodynamic soundness. The Whittelsey *Amphib* will fly hands-off on either full throttle or in a throttled glide. It is remarkably stable in the air as well as on the water and defies spinning at the hands of even the most experienced test pilots.

With the roomy, draft-proof cockpits situated well forward and the propeller located in the rear, pilot and passengers are comfortably shielded from spray, slipstream and spattering oil.

Those who cannot resist the call of open water, receding landscape and "the third dimension" will find in the Whittelsey *Amphib* the result of the master boatmaker's and aircraft designer's professions—an answer to the challenge to sporting blood.



THE WHITTELSEY AVIAN

And for the student, overland commuter and those who prefer to sport above the ground there's the Whittelsey *Avian.* Popular as a training plane and famous for its record flights all over the world, the *Avian* offers downright safe performance that no other light plane can equal. And economy that can't be beaten—every gallon of gas gives 20 miles of sure, swift travel. You can buy an *Avian* now for about $1358.00 down and the balance in monthly payments.

DEALERS

Here are two planes that meet every demand of training, sport and business flying—over land and water. Responsible dealers and distributors are invited to investigate the Whittelsey franchise covering these two planes. Write for our sales plan and for full data and specifications of the planes themselves. The Whittelsey Manufacturing Company, 220 Howard Avenue, Bridgeport, Conn.

WHITTELSEY  **AVIAN & AMPHIB** 

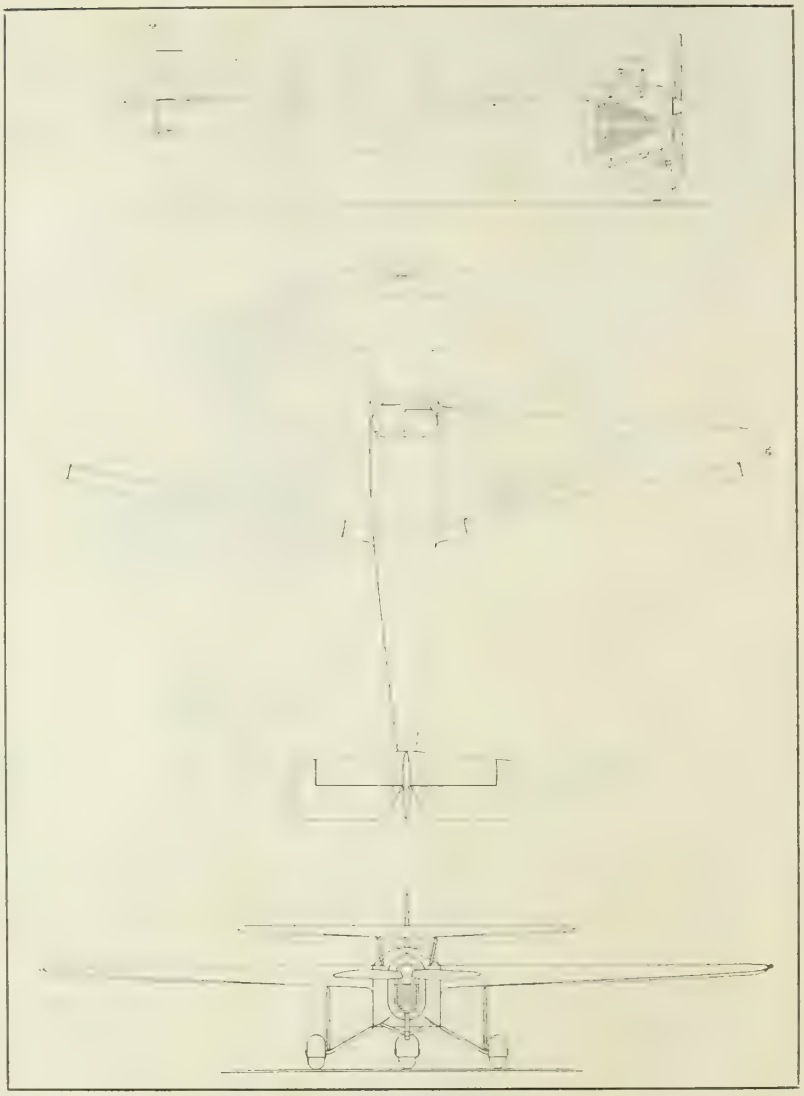
THE FERNIC "CRUISAIRE" TANDEM PLANE

THE Fernic Cruisaire is a two-place tandem-monoplane developed by George G. Fernic. The front wing of the Crusaire is mounted above the fuselage, above and forward of the cockpit and the main wing, with which it is placed in tandem. This forward wing has a span equal to one-half that of the main wing, and an area about one-fourth that of the main wing. The gap between the front and rear wing is equal to thirty per cent of the chord of the main wing measured at the root. The stagger of the front wing is ten per cent greater that the chord of the main wing, measured at the root sections.

The design of the Cruisaire, according to Mr. Fernic, has eliminated the following disadvantages ordinarily resulting from the tandem arrangement of wings; loss of efficiency of the celulle because of the downwash of the forward wing; and excessive stresses existant in the structure of the fuselage between the wings. These disadvantages, according to the designer of the Cruisaire tandem monoplane, result only in tandem wings with equal span placed without regard to elevation on the same base chord line.

The arrangement of the wings of the Cruisaire results in negative decalage, the front wing being set at minus two degrees in relation to the main wing. This front wing meets the air at an angle higher than apparent in this setting of the two wings as the result of the upwash of the main wing. The downwash of the front wing prolongs the efficient range of the main wing by a slot-like action due to its setting.

The center of gravity is located between the wings. The front wing, therefore, is designed to stall earlier than the main wing and, on reaching its burbling point, introduce a pronounced anti-stalling moment to the entire ship.



The Fernic Cruisaire is provided with a three-wheeled landing gear. Two of these wheels are placed slightly behind the center of gravity, and the third wheel is located under the nose of the fuselage in front of the center of gravity. This front wheel is relieved of excessive shocks in rough landings by the damping effect of the front wing, according to the designer, and permits a full application of the brakes with a



Views of the Fernic monoplane with unusual wing arrangement and triple air wheel landing gear

minimum possibility of a noseover. On the ground, the ship rests on the three wheels. There is no tail skid.

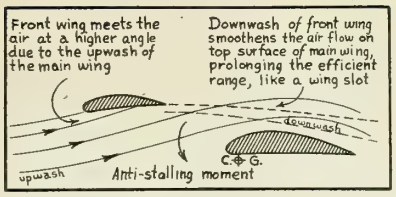
The wings of the Cruisaire are of full-cantilever type and are constructed of wooden box spars covered with fabric. The fuselage is built of steel tubing and is fabric-covered. The fuselage has a flat bottom construction designed to permit a maximum elevation of the tail surfaces above the ground. Unobstructed visibility is provided by locating the cockpit at the leading edge of the main wing and elevating the front wing on a cabanne; the power plant is mounted in the nose of the fuselage, out of vision of the pilot.

The Cruisaire is powered with a Rover four-cylinder in-line air-cooled, inverted aircraft engine of 75 horsepower.

A side-by-side seating arrangement and dual controls are provided.

Specifications

Span, front wing	12.5 feet
Span, main wing	25 feet
Area, front wing	22 square feet
Area, main wing	98 square feet
Total wing area, including ailerons	120 sq. ft.
Aileron area	15 square feet
Stabilizer area	7.5 square feet
Elevator area	14 square feet
Fin area	3.5 square feet
Rudder area	4.25 square feet
Airfoil section	U. S. A. 35-A
Wing loading	11.5 pounds per square foot
Power loading	18.4 pounds per horsepower
Weight empty	875 pounds
Gross weight	1,388 pounds
Gasoline capacity	30 gallons
Oil capacity	2¾ gallons
High speed	110 miles per hour
Cruising speed	95 miles per hour
Landing speed	35 miles per hour



Aerodynamic action of Fernic wings

WESTINGHOUSE STROBOGLOW

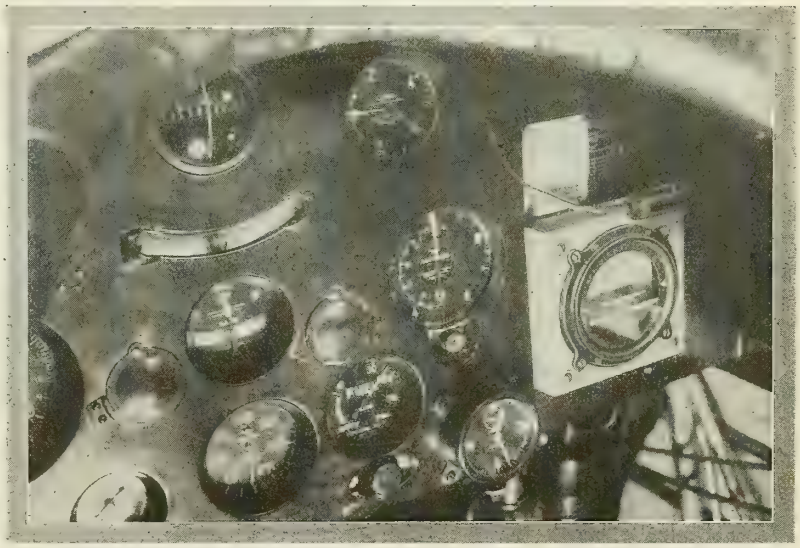
A PORTABLE apparatus called the Stroboglow, which permits the reading of markings on an airplane propeller revolving more than 1,000 revolutions per minute, has been developed by the Westinghouse Electric & Manufacturing Company of Pittsburgh, Pa. By means of this apparatus, propeller quiver, cracks and engine valve action are visible to the naked eye while the propeller is revolving.

The Stroboglow was invented and developed by D. D. Knowles, L. R. Peters and W. E. Bahles, of the Research Laboratories of the Westinghouse company, and makes moving objects appear motionless by means of flickering lights regulated to flash at intervals corresponding to the speed of the moving object.

Artificial Horizon Instrument for Flying Blind

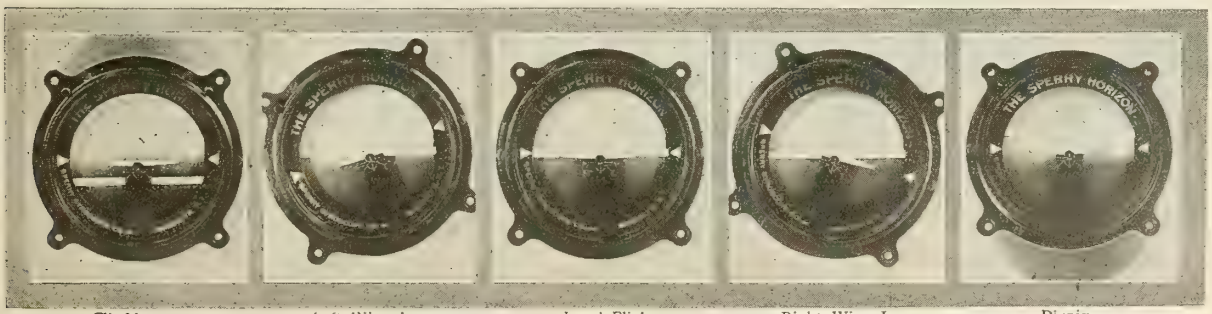
THE "Artificial Horizon" is a gyroscopic instrument designed to facilitate "blind" flying through fog clouds, darkness and conditions of flight where the natural horizon is obscured or invisible. This mechanism has been flight tested over a period of many hours in the air under the supervision of the Sperry Gyroscope Corporation of Brooklyn, N. Y., which has developed the device. The Artificial Horizon was included in the set of flight instruments used by Lieut. James Doolittle in the blind flying experiments conducted at Mitchel Field L. I., under the auspices of the Guggenheim Fund for the Promotion of Aeronautics. Lieut. Doolittle completed a flight in an enclosed cockpit, flying entirely by the use of instruments.

The instrument is simple in appearance and weighs four pounds. The face of the Artificial Horizon is circular and is colored to represent the natural horizon with blue on the upper portion to represent the sky. The true horizon is indicated by a bar across the face of the instrument. A small airplane which represents the ship in which the Horizon is installed is fastened to the outer case of the equipment. When the instrument is in operation, the small plane is kept in a relation to the bar as the plane in flight is positioned in relation to the natural horizon.



The Sperry Artificial Horizon mounted on an instrument board for testing

The Horizon is designed to be used without special training. The same reflexes developed for operating the controls of a plane by observing the natural horizon are used in the operation of this instrument.



Climbing — Left Wing Low — Level Flight — Right Wing Low — Divnig

Instrument simulating indications of the horizon for the five attitudes of flight, showing the plane's relation to the horizontal

BROWNBACK TIGER C-400 ENGINE

THE Brownback Tiger C-400 aircraft engine is produced by the Light Manufacturing and Foundry Co., Pottstown, Pa., under Approved Type Certificate 33 issued by the Department of Commerce. This power plant is rated at 90 horsepower at 1,700 r.p.m.

The propeller hub and flange are made of high carbon steel drop forgings with ground alloy steel bolts. The hub is carried on the tapered forward end of the crankshaft and is of the self-pulling type.

Two Bosch magnetoes are mounted on adjustable flanges on the gear case cover. The armature shaft gears are driven 1½ times engine speed directly from the magneto drive gear on the end of the crankshaft. All gears are heat-treated alloy steel.

The oil sump is an aluminum casting attached to the bottom of the crankcase. It contains a filter chamber with a fine mesh oil screen. Cooling fins on the outside of the sump serve to cool the oil before it is returned to the tank. The carburetor is also bolted to this unit. The warm oil heats the inlet gas slightly.

The Stromberg NAR-3 carburetor is used. The gas, after leaving the carburetor, passes through the cored passage in the oil sump, where it is warmed by the heat radiated from the oil to the inlet manifold, which, being cast integrally with the rear half of the crankcase, is designed at the bottom so as to spread the warm gas two ways; *viz.*, for each side of three cylinders, thereby supplying even distribution to each cylinder.

The gas then passes the inlet valve in the cylinder head through the manifold and the aluminum, oval inlet pipes, which lie with the flat side toward the rear of the cylinders so that they are kept warm. The inlet pipes are sealed in the crankcase with oil- and gas-proof rubber rings.

The engine operates with only one cam gear. The cam gear is of alloy steel, case hardened, and lubricated by direct force feed. It is driven by the crankshaft timing pinion, through an idler gear and intermediate gear, which also drives the oil pump. The cam gear floats on an extension of the rear main bearing. It runs at half engine speed and is so formed that it carries two separate cams, one for the intake and one for the exhaust, acting on separate cam followers through rollers. The cam followers are generously proportioned and, being long, are less subject to wear and oil leakage. A special oil recuperation system is embodied in the cam follower system to prevent external oil leakage.

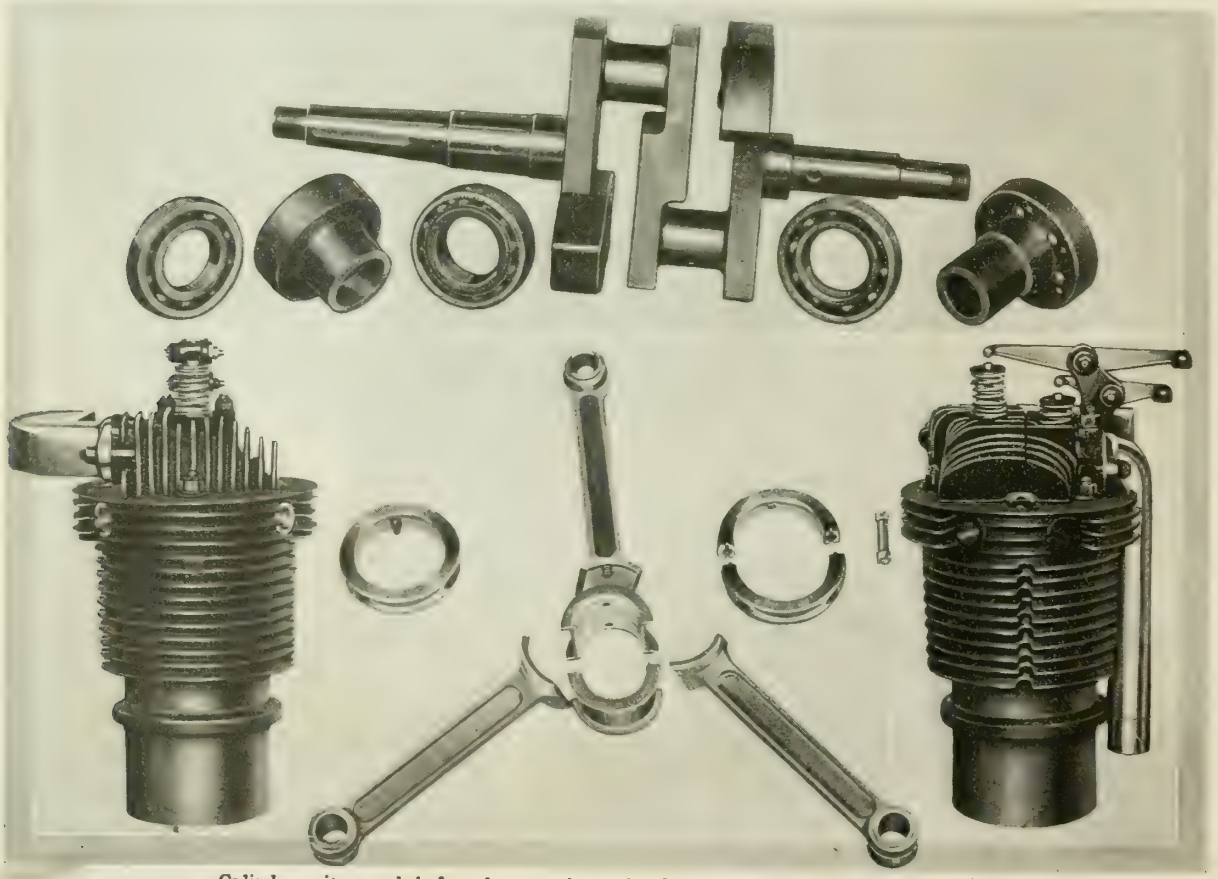
The starter gear is of forged nickel-chromium steel, hardened, and meshes directly with the magneto drive gear on the crankshaft. The starter gear is splined for use with any standard American five-inch starter.

The oil pump is mounted on the gear case cover below the two magnetos. Both the pressure and scavenge pumps of the gear type are built in this one accessible unit, which can be easily removed without disturbing any other part of the motor. This pump insures a high pressure and a large circulation of oil, thereby providing adequate cooling and permits the use of mineral oils of aviation grade.

The pistons are of heat-treated aluminum alloy, cast in a semi-permanent mold, with internal cooling fins. Four rings are used, two compression, one oil regulator and one oil scraper. The piston pins are of low carbon, chrome-nickel steel, taper bored for added strength. They are also case hardened, ground and lapped. The pins float in the bronze, bushed head of the connecting rod and the piston bosses, and are retained from end motion by spring steel rings set in grooves.

The connecting rods are of the slipper type, the slippers bearing on the bronze back of the crankpin bearing. The rods

(*Continued on next page*)



Cylinder units, crankshaft and connecting rods of the Brownback Tiger C-400 engine

Full loads *with* "Caterpillar" Tractors



Plenty of power—the sure traction that conquers sand and mud—positive steering—*thus are full loads assured to the earth mover**. Wide "Caterpillar" tracks bridge soft spots and wet—they worry about the weather not at all! So are jobs completed in record time—so is the owner of "Caterpillar" equipment able to handle a greater number of jobs at greater profits!

Prices—f. o. b. Peoria, Illinois

TEN	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY	$2375
SIXTY	$4175		

Caterpillar Tractor Co.

PEORIA, ILL., *and* SAN LEANDRO, CALIF., U.S.A.
Track-type Tractors / Combines / Road Machinery
(There is a "Caterpillar" Dealer Near You)

CATERPILLAR
REG. U.S. PAT. OFF.
TRACTOR

*The picture shows a "Caterpillar" being used to enlarge the airport at Long Beach, California.

(*Continued from preceding page*)

are held in place by two split forged aluminum-bronze collar bearings which bear on the outside of the slippers and are held together by alloy steel bolts. The joints of the collars are tongued and grooved. The connecting rods are of I-beam section, alloy steel forgings (heat-treated) finished all over. One rod is anchored to the connecting rod collars and the crankpin bearing, forming a master rod assembly. The axes of all connecting rods pass through the center of the crankpin. The rods are of equal length. Though the actual length of the slipper is 88 degrees of the outside circumference of the bushing, the diagonal cut at the lower ends of the rods makes the effective length 116 degrees and prevents canting.

The angular motion of the rods under the collars and over the bearings is only 43 degrees, and the whole assembly is lubricated with oil under pressure.

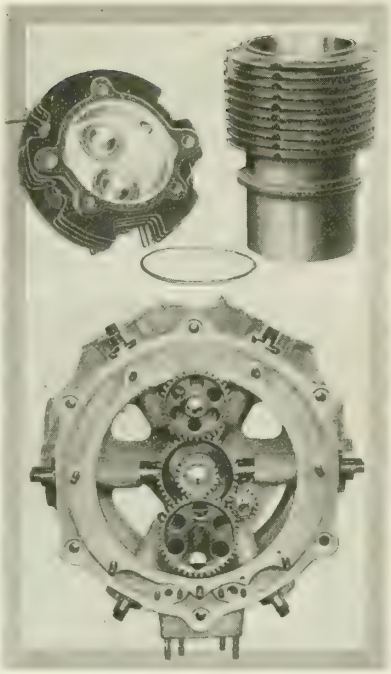
The crankpin bearing is a bronze back, babbit lined bearing of the split type, tongued and grooved at the joint. Flanges on the ends of this bearing are gripped by the two collar bearings, thus forming a rigid assembly. The tensile strength of the collar bearings is 95,000 pounds per square inch, with an elastic limit of 80,000 pounds per square inch.

The valves are operated from a tangential cam, running at one-half engine speed on an extension of the rear main bearing. The cam motion is transferred through roller cam followers and adjustable tubular push rods, having hardened alloy steel ball ends, to alloy steel rocker arms.

The ball socket end, which operates the push rod ball, and the cylindrical end opervating the valve are case hardened.

The rocker arms are placed one above the other, in the axis of flight, so as to give a minimum of head resistance. The rocker arms, which are drop forged alloy steel, and oil hardened, operate on hollow case hardened alloy steel fulcrum pins, having grease lubrication, and are carried on a single forged alloy steel pedestal, fastened to each cylinder head by two studs and nuts, lock wired. The valves are tulip type, with 30-degree seats, made of silchrome steel. A hardened steel cap fits over the end of the valve stem and takes the wear off the rocker arm. Double springs of chrome-plated vanadium steel are used with conical, alloy steel locks. The engine thrust on the rocker arm is straight line thrust.

The heat-treated, aluminum alloy heads, with cooling fins cast integrally, are carried on cast nickel-chrome iron barrels (heat-treated). The lower end of the cylinders form a long sleeve extending into the crankcase, accurately piloting the cylinders and acting as an oil shield. Each cylinder is held down by two forged alloy steel bolts and is carried on alloy steel crankcase through bolts. Thus, the force of the explosion pressure is carried directly from the cylinder head through alloy steel bolts to the crankcase through bolts. Three additional alloy steel studs hold the heads to the barrels, insuring the gas tightness of the copper-asbestos gasket. The cylinder head is attached to the barrel by a male and female joint, to eliminate possibility of blowing gaskets.



Tiger cylinder parts and the middle section of crankcase

The cylinder head contains two ports, the axes of which are at right angles to each other; to the port facing aft is attached the inlet pipe and to the port projecting in the plane of the cylinders is fastened the exhaust horn. Bosses within the ports carry the bronze valve guides which are pressed into position. Valve seats of aluminum bronze are shrunk within the cylinder head.

Removing the two nuts from the hold down bolts permits the cylinder and its intake pipe to be withdrawn without disturbing the cowling, etc. The inlet pipes are a sliding fit into the inlet manifold ring in the crankcase, sealed with a gas and oil-proof rubber ring. The inlet pipe comes off with the cylinder when this member is removed, without breaking any gasket joints.

The crankcase is a rigid three-piece aluminum casting made of heat-treated alloy. The two forward sections form the crankcase proper and are split vertically and fitted together with a piloted joint. The front portion is hemi-spherical in shape, insuring light weight and strength, and its form permits cowling, which will keep down head resistance. It carries the front main and thrust bearing and also the bearing provided to carry the radial load from the propeller. A very efficient oil turbine mounted in front of this bearing prevents the loss of oil from the front of the case. The oil relief valve and the breather are located in this section of the crankcase.

The middle section carries the main rear bearing, tappet guides and mounting pilot. The inlet manifold is cast integrally with this section. These two sections are held together with nickel steel through-bolts, which also serve to hold the engine on the mounting plate. The propeller thrust is thereby carried through alloy steel through-bolts to the mount plate, thereby eliminating stress on the main section of the crankcase. The rear crankcase cover serves as a gear case cover and mounting for the oil pump, starter and magnetos. All gears are carried at the rear of the engine and are accessible by removing this cover without dismounting the engine.

In low temperatures it becomes necessary at times to preheat the air entering the carburetor. In order to accomplish this, an air heater with the air opening to the rear has been installed as standard equipment. It is constructed entirely of cast aluminum. In the pipe which carries the exhaust from No. 4 cylinder to the heater is assembled a gate which can be opened or closed at will from the pilot's seat, permitting all or part of the exhaust to enter the heater, thereby maintaining a desirable air temperature at all times.

The crankshaft is a drop forging of electric furnace, nickel-chromium steel with high physical properties. The shaft is carefully machined all over, liberally filleted, and counter-weighted so as to balance the assembly of connecting rods, their bearings and the reciprocating masses of the upper ends of the connecting rods and pistons.

A two-throw shaft is used, the center web being undercut so as to bring the axes of the cylinders closely together and to minimize the slight couple which is the only unbalanced force present and which is counteracted by the counterbalance weights.

The crankshaft is hollow and provides ample passage for pressure lubrication. The oil is fed into the shaft through the rear main bearing and out through the front main bearing. Oil holes are provided in the crankpins and afford lubrication, under pressure, to connecting rod bearings and collars.

The main bearings are a combination of ball and plain bearings, the thrust being taken directly at the crankshaft front cheek on a two-row deep-groove ball bearing. The magneto drive gear and timing pinion are carried on the rear end of the crankshaft and can be removed by removing one nut.

Specifications

Horsepower	90 at 1,700 r.p.m.
Bore	4.13 inches
Stroke	5 inches
Piston displacement	397 cubic inches
Compression ratio	4.8 to 1
Overall diameter	37 inches
Length	29¼ inches
Weight dry	234 pounds
Diameter of mounting ring	13 inches

G. E. ENGINE TACHOMETER

THE General Electric Company has announced an electric tachometer designed to indicate the speed of aircraft engines. This tachometer operates on the principle of generated frequency (instead of generated voltage) of a small magneto type generator which is part of the equipment.

Keeping an Eagle Eye on ELECTRIC *and* GAS SERVICE

Serving 313 communities in 6000 square miles of territory, the Public Service Company of Northern Illinois uses a Sikorsky Amphibion to add speed and efficiency to the administration of its properties

•

QUICK to make use of every scientific development which can give added speed and finesse to its operation, the Public Service Company of Northern Illinois long ago saw major advantages in the use of aircraft. After a careful study of existing types, they purchased a ship exceedingly well suited to their particular requirements . . . a Sikorsky Amphibion.

This "S-38," appropriately christened the "*Northern Light*," serves its Company . . . and the Company's hundreds of thousands of customers . . . in making surveys of proposed electric transmission lines, power development sites, gas mains and coal lands. Further, the ship forms a tremendously important means of quick transportation for officials, men, apparatus and tools to points of emergency. In many cases the plane is landed on water, conveniently near the Company's stations.



Photo: Chicago Aerial Survey Co.

How the Maywood, Ill., Gas Holder looks from the comfortable cabin of the "Northern Light." Note the direction marker on top. This valuable guide to pilots is illuminated after dark and is visible from an altitude of more than a mile

Like all her sister Sikorsky Amphibions, the "*Northern Light*" is equally at home on open water or fields. Her landing gear is easily convertible for use asea or ashore in a matter of seconds. With two 420 H.P. Wasp engines she has a cruising speed of 110 miles per hour and she can fly and maneuver on either engine.

Here is a ship of remarkable reserve power, luxurious comfort and complete adaptability to landing conditions. Sikorsky Amphibions are proving splendid investments for public utilities, transport operators, business firms and individuals. The reasons for this are interesting. Some of them are contained in a recently issued booklet. May we send you a copy?

Sikorsky Aviation Corporation, Bridgeport, Connecticut. Division of United Aircraft & Transport Corporation.



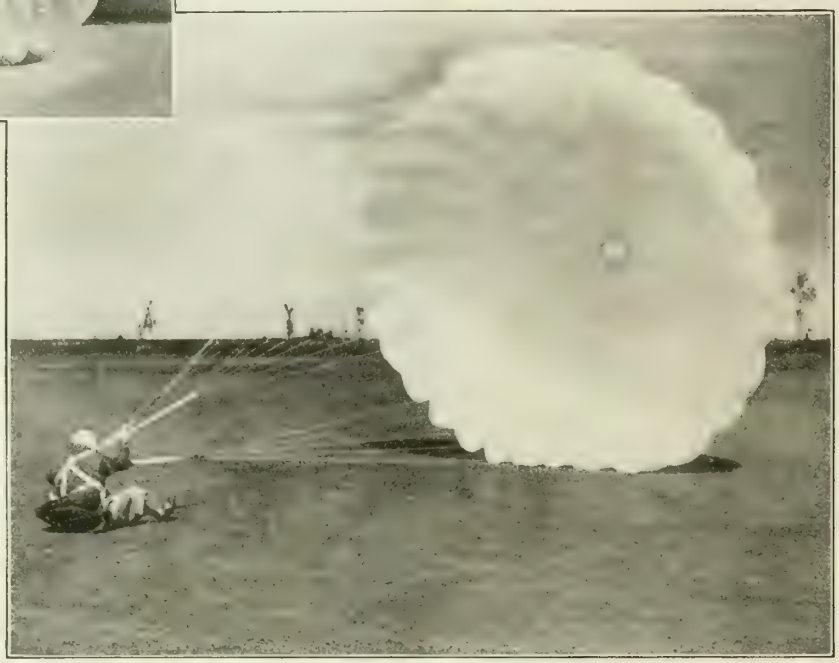
SIKORSKY AMPHIBION



Why BLACK on WHITE?

The dark spot near the middle of the white canopy, in the picture at the left, shows one of the outstanding features that distinguishes the Floyd Smith Safety Chute from all others. It is the combination Pack Cover (before releasing) and Pilot Chute (after releasing). This combination makes the most compact, smoothest pack and the quickest-to-open Chute.

Floyd Smith Safety Chutes



—new improvements just recently made

Since the national announcements of my new Company, letters have come to my desk here in Buffalo from flying men and aviation organizations, the country over. All are interested in the new, greatly improved Chute that my new facilities and resources here enable me now to offer you.

THIS new Floyd Smith Safety Chute, accordingly, embodies all of the features that my nearly 20 years of flying and parachute work have proven to be sound and effective in aerial life-saving. But this is not all.

I have been able, here, to go a great step ahead in incorporating at once, many new improvements to this Chute that all will immediately recognize.

Outstanding among these, are the new canopies which are made from the same special white silk and are identically the same in design and construction as those used by all Air Forces of the United States and Great Britain and many other governments throughout the world. This international standard of Chute design and construction is more expensive to build but makes a stronger and safer parachute than any other type of construction known.

By the acid test of years of service trials in many countries this type has become universally recognized as the best Chute it is possible to manufacture.

Now, due to cross-license arrangements made by the Floyd Smith Safety Chute Co., I am able for the first time to give genuine Floyd Smith Safety Chutes with these important features, making them 100% automatic following their 100% manual control.

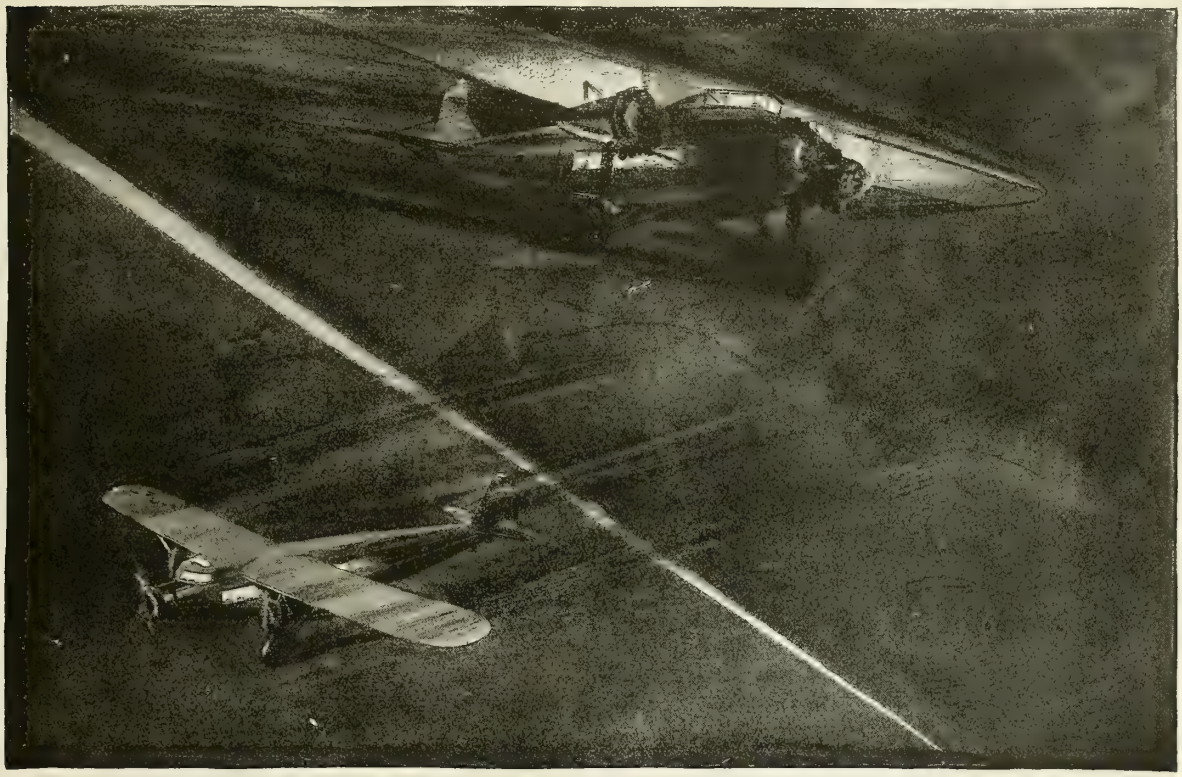
For immediate delivery of these improved Floyd Smith Safety Chutes—write or wire today. Dealers will be interested in our "Parachute Proposition".

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Floyd Smith

SAFETY CHUTE COMPANY

528 GENESEE BLDG., BUFFALO, N. Y.



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CARRYING passengers adds to your responsibility—makes it even more necessary to reduce hazards by every available means. That's why so many transport companies rely on -TP- to keep the engines running smoothly.

-TP- Aero Motor Lubricating Oils are new—the latest development in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded, produced from pure, paraffine-base crude by a process for which patents are pending.

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2782

WESTERN NEWS

AERO ACTIVITIES IN LOS ANGELES COUNTY

PRODUCTS of aircraft and aeronautical accessory manufacturers in Los Angeles County totaled approximately $20,000,000 in 1929, according to statistics recently announced by the United States Department of Commerce. More than 1,500 persons were employed in the production. Over $5,000,000 was invested in airports and airport equipment in Los Angeles County at the end of this period, the chief improvement being the $1,000,000 airport developed by Western Air Express.

There were 156 airports in California and of this number, fifty-six were located within the metropolitan area of Los Angeles. There were 1,527 airports in the United States, California having the greatest number of any single state, according to the statistics. A total of 2,200 students were enrolled in aviation schools in the Los Angeles district during 1929, as compared with 1,000 students during 1928.

More than sixty per cent of the aviation activity in California is centered in Los Angeles County, and thirty-two per cent of the flying activities in the United States are located in the Southern California section. The statistics of the Department of Commerce showed that approximately 1,000 aircraft are operated daily in the United States on scheduled air transport operations, and on charter trips, and that three-fourths of these planes are being operated in Southern California.

Twenty-four scheduled air transport lines carrying passengers, mail and express are being operated in and out of Los Angeles. Thirty planes of three air transport companies operating out of Los Angeles daily either take off or land every twenty-four hours. In addition, six planes operated on a tri-weekly service to Mexico City, Mexico, arrive and take off at Los Angeles. The greatest number of arriving and departing planes during a twenty-four hour period are operated by Western Air Express. Sixteen ships of this company operated in passenger, mail and express air transport service arrive and take off daily at Los Angeles. The total daily mileage of ships operated in and out of Los Angeles is 8,000 miles.

There are 1,464 pilots in California licensed by the Department of Commerce and over 1,000 of them are located in Los Angeles County. This number is exclusive of pilots of the Army Air Corps and the Naval Air Service stationed in California.

Planes operated in passenger, mail and express air transport service in California had a total daily mileage of more than 90,000 miles at the end of 1929. One-third of this mileage was being flown in scheduled night air transport operations over lighted airways.

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Dedication Ceremonies of Los Angeles Airport Scheduled for June 6

DEDICATORY ceremonies of the Los Angeles Airport, Inglewood, Calif., will be held June 6, according to a recent announcement of officials in charge of the ceremonies.

The program of events includes an address by Mayor John Porter of Los Angeles, officially opening the dedicatory ceremonies; addresses by John C. Austin, and Col. Thomas Cooke, and flights over the field by a Goodyear blimp and other aircraft.

The Second Annual Hangar Night of the Southern California chapter of the National Aeronautic Association will be held in the hangar recently constructed at the field. Sixty-five exhibits of aircraft and aeronautical accessories will be included in the aircraft show held in conjunction with this event.

Officials in charge of the dedicatory ceremonies include Rufus Filcher, chairman of field operations; and John Bower, Maj. Walkup, W. H. Earle Ovington, and J. Nikrent. Robert J. Pritchard, president of the Southern California chapter of the N.A.A., will preside at the hangar dinner.

Aero Corporation of California Begins Program of Expansion at Airport

CONSTRUCTION of two shop buildings has been completed at the field of the Aero Corporation of California at Los Angeles, Calif. The buildings are the first of several which will be erected on the field and are included in a program of expansion of repair and service facilities which has been adopted by the company in conjunction with the recent merger with Western Air Express. One of the buildings which have been completed will contain the sheet metal department.

Eighty-six men are now employed in the shop department of the Aero corporation.

Operating Equipment of Former Standard Airlines Moved by W.A.E.

THE operating equipment of the former air transport company, Standard Airlines, has been moved to the airport of Western Air Express at Los Angeles, recently developed at a cost of $1,000,000. Standard Airlines recently merged with the Western company. The maintenance shops and storage hangars formerly operated by the Standard company will remain at the field of the Aero Corporation of California at Los Angeles. All passenger ships will land and take off at the field of Western Air Express and all major overhauls will be made at the Aero Corporation field.

The passenger planes formerly operated by the Standard company will be operated from the Western Air Express field to permit passengers from the Southwest to make connections with the final northbound plane of Western Air Express to San Francisco, which leaves at 4:35 p.m.

William Kingsley, formerly operations official of the Standard company, has been appointed superintendent of the Los Angeles-Dallas and Los Angeles-Catalina routes.

FIVE model F Waco planes and one Waco 225 have been received by the Aero-Pacific Corporation, United Airport, Burbank, Calif., according to a recent announcement of officials of the Waco Aircraft Company of Troy, Ohio. The Aero-Pacific Corporation was recently appointed Waco distributor for California, Arizona, and Nevada. The company has appointed a total of twenty dealers. In addition to the six Waco planes, the Aero company has ordered a Waco glider and a supply of airplane and aircraft engine parts.

Organization of Hancock Foundation College of Aeronautics

THE Hancock Foundation College of Aeronautics is located at Santa Maria, Calif. The school operates the following flying equipment for instruction purposes: One Buhl CA-8; one Ryan B-5; one Curtiss Robin; one Avro Avian with instrument and hooded cockpit; three Whirlwind Stearmans, one with Whirlwind Seven; three Great Lakes, American Cirrus powered trainers, and twelve Fleet Model 2 trainers.

The flying field operated by the college, which was recently named Hancock Field, has been enlarged and comprises 143 acres, which are available for landing and taking off. The additional ground gives an east-west runway 3,900 feet in length, and a north-south runway 2,000 feet in length. The field is equipped with boundary lights, obstruction lights and floodlights, which were recently installed.

There were in attendance at the college at the end of April fifty-five regularly enrolled cadets, thirteen of whom are in the mechanical division. With a new class

(*Continued on next page*)

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HAROLD HOLMES

AIRTECH

LINDBERGH FIELD SAN DIEGO

(*Continued from preceding page*)

of approximately forty students entering on May 20, the cadet body numbered about eighty-five at the end of May. This number represents the normal operating capacity of the college, and is the approximate number of active cadets that will be enrolled at all times, depending upon eliminations.

The college recently received its Approved School rating from the Department of Commerce. No provisions are maintained for the operation of a limited commercial course. No one is accepted for a flying course other than the transport, unless he is a college man taking up aeronautical engineering, these students being eligible for the private course. The private course is completed in four months and permits college students to obtain their private pilots' licenses during the summer vacation.

THE PACIFIC COAST AERO EXPOSITION

THE Pacific Coast Aeronautical Exposition will be held at the Oakland Municipal Airport, Oakland, Calif., June 28-July 6, according to a recent announcement of officials in charge of the show. A publicity campaign emphasizing safety in aviation will be sponsored in connection with the show through the mediums of the radio, advertising and addresses included in the program of events.

Approximately forty lectures on aviation will be given during the show and will be free to those who attend. These lectures will be broadcast and will include discussions of safety in aviation. No stunt flying will be permitted in connection with the exhibition. Flights for the purpose of demonstrating to the public the safety and advantages of airplane transportation will be made as a major part of the program of activities.

Special Aviation Course for City Officials Given by University of Southern Calif.

PAPERS on aviation were presented by officials of air transport companies during a six-day course for city officials given recently by the University of Southern California. The course was called, "School of Citizenship and Public Administration." Prof. Earl W. Hill was in charge of the course. The course was given for the purpose of assisting municipal officials in drafting ordinances affecting the operation of air transport companies and the establishment of airports.

Speakers included the following: Herbert Hoover, Jr., W. M. Bishop, C. C. Cole, and James G. Wooley, all of Western Air Express; Woodruff De Silva, assistant director of airports, Los Angeles Airport; and Maj. C. C. Moseley, western manager of the Curtiss-Wright Flying Service.

MID CONTINENT AIR EXPRESS has accepted delivery on a new Fokker Super Universal from the Aero Corporation of California, Fokker distributors. The plane will be added to the fleet of Fokker Super Universals operated by the Mid Continent Express on schedule passenger service between El Paso and Denver.

MANUFACTURE of a two-cylinder aircraft engine weighing less than twenty-five pounds, including the propeller, and designed for installation on powered gliders, was announced recently by Lee Bowman, president of Dawn Motors, Ltd., of Los Angeles, Calif. The engine will develop from five to seven horsepower, and will be of the opposed piston type. The frontal dimension of the power plant will be twelve and one-half inches by five inches and the gasoline consumption will be two quarts an hour.

Boeing Company Will Issue Insurance Policies for Passengers

PASSENGERS on the Chicago-San-Francisco and Los Angeles-Seattle routes of the Boeing System may receive special insurance policies similar to those provided to railroad passengers through an arrangement recently effected by the Boeing company with a nationally known insurance company, according to a recent announcement of officials of the Boeing company. The insurance is handled through local traffic agents and field managers of the operating company. A $5,000 policy good for twenty-four hours may be obtained for $2. An additional twenty-four hour period of grace is allowed if the plane is unavoidably delayed.



Loening Amphibion operated by Air Ferries, Ltd., flying over San Francisco, Calif.

BOEING ESTABLISHES AIR SCHOLARSHIPS

FOUR aviation scholarships with a total value of $7,100 have been established by W. E. Boeing, of the Boeing System. Winners of the scholarships will receive instruction at the Boeing School of Aeronautics, Oakland, California.

The first award is the W. E. Boeing master pilot ground school and flying scholarship, a nine months' course covering 203 hours of flying and 924 hours of ground school instruction. Second award is the Boeing master mechanic course, consisting of nine months of instruction. The third award is the Boeing master pilot ground school course, with nine months of instruction; and the fourth award is the Boeing private pilot course, requiring from two to four months of ground and flight instruction.

Any undergraduate student who has completed at least one year of instruction at any college or university is eligible as a candidate. Candidates must have maintained a scholastic standing in the upper one-third of their class for the entire period of their enrollment. The candidates must write an essay on one of the following subjects: "Aviation's Contribution to Internationalism," "The Development of Air Transportation and Its Possibilities," or "The Development of Safety Features on Established Air Transport Lines." The essays which must reach the Boeing school by June 9, will be judged by a National Committee of Award, composed of prominent educators and leaders in the aeronautical industry.

CONTACTS

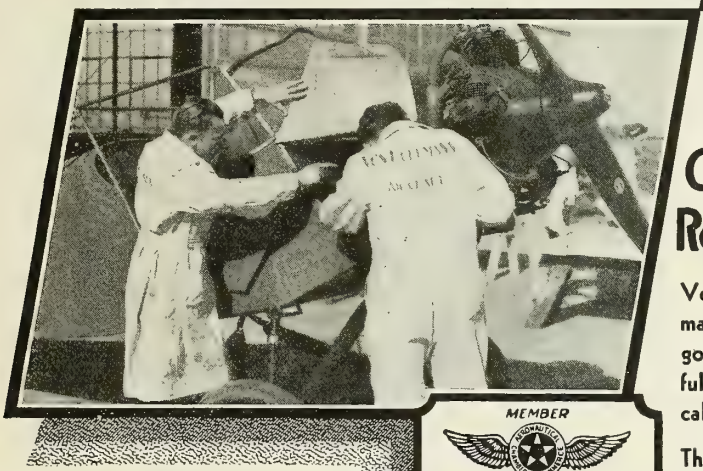
[F. E. SAMUELS]

I RECENTLY completed a trip over the northern section of the West Coast, visiting airports and aircraft factories. Leaving Los Angeles with an early morning start, we drove over the new Coast highway for ninety miles, our first stop being at Smith's Airport, formerly the Chadbourne-Donze Airport, situated ten miles south of Santa Barbara, on the highway, one-half mile south of Carpinteria. Smith is enlarging the field for two runways, one 1,850 feet by 350 feet and one 2,400 feet by 400 feet. A new stucco hangar accommodating ten planes is being erected. W. G. Smith, Jr., started as mechanic with Jack Chadbourne in 1927 and worked successfully as mechanic, pilot, instructor and manager, buying the business in September, 1929, and now operating a school and commercial flying field. Just north of Santa Barbara, situated on a plateau on the side of a hill, is the private flying field of Earle Ovington. Earle always keeps one plane at the field for his own personal use and for his friends' accommodation.

(*Continued on next page*)

Leaders in AVIATION Demand the Thoroughness of VON HOFFMANN Training





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Von Hoffmann graduates, busy today at many flying fields and factories are making good. Aviation needs capable men, carefully developed, thoroughly trained. The call is not for more men but for better men.

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A Government Rated School located on a $2,000,000 airport . . . modern concrete hangars and classrooms . . . a fleet of Government Approved planes, various late types, open and cabin . . . comfortable living quarters with all modern conveniences. Our liberal time payment plan makes it possible for you to pay half your tuition after you have finished your instruction. Make your start in aviation TODAY . . . mail the coupon NOW!

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St. Louis, Mo.

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Address.....

City..... State.....

Age..... I am interested in

☐ Flying Courses ☐ Mechanics Course
☐ Welding Course ☐ Home Study

(*Contacts continued*)

ALONG and beautiful drive along the ocean and through Gaviota Pass, brought us to the Santa Maria Airport, home of the Hancock Foundation College of Aeronautics, financed and owned by J. Allen Hancock. The school is a semi-military aviation college, where the student classes have all the advantages of an Army and Navy aviation training, combined with home and civilian society.

THIRTY-TWO miles north, along the ocean and past Pismo Beach, brought us to San Luis Obispo, where a new airport is under construction, which should be of service to pilots flying north or south over the shore or coast route. Another thirty miles to Paso Robles, then forty miles to King County, with emergency flying fields at both towns. Then fifty-one miles due north to Salinas, where the American Legion has built an airport that would be a credit to many much larger cities.

LEAVING Salinas, we stopped at the flying fields at Hollister, fifteen miles west, and at Watsonville, twenty-one miles north. Then, due north twenty-nine miles to San Jose, where four miles due east of the city is a well laid out airport. Planes of the Pacific Air Transport, feeder air mail line between San Jose and Oakland, make this field a base. A flying school and aerial taxi service are operated at the airport.

NINETEEN miles north and west of San Jose, and on the highway, is the airport of the Palo Alto School of Aviation, formerly operated by the late Lieut. Norman A. Goddard. Student instruction, short flights and cross-country trips are included in the activities at the field. Traveling thirty miles north, along the west shore of San Francisco Bay, we stopped at Mills Field, the San Francisco municipal airport. The property has recently been purchased by the city and many improvements are under way. Captain Roy N. Francis, veteran World War flier, is superintendent of the field.

WHILE at Mills Field we had the pleasure of meeting Mr. Dana, of the W. P. Fuller Paint Company, and Harvey Lencke, pilot of the Fuller company's Stearman, in which they are touring the West Coast. Landing at an airport in a city or town, they invite their customers to take a flight in their ship, free of charge. Since the purchase of their plane on January 23, they have completed 1,076 flights, with two passengers each flight, flying over Arizona, Imperial Valley, San Diego, Southern California and the San Joaquin Valley, 239 flying hours without a forced landing.

ADJOINING Mills Field is the 100-acre flying field and plant of the Marchetti Motor Patents, Inc., owned and operated by the United States Aircraft Corporation. Two large buildings for the manufacturing plant have been erected and a runway has been graded. While at San Francisco we visited the Sidney Aviation Sales and the Kleiber Motor Company.

CROSSING the bay by ferry, our next stop was at the Alameda Airport, which is under the management of the Curtiss-Wright Flying Service. The airport is the northern terminal of the T.A.T.-Maddux transport lines. The Alameda Airport is but a short drive from the Oakland Municipal Airport, which was our next stop. While at the airport, I had the pleasure of meeting Mr. H. F. Lusk, dean of the Boeing Flying Schools, who conducted me through the classrooms and shops. Over 270 students are enrolled at the school.

WE THEN headed north, stopping at Berkeley, where we visited the Jucuzzi Brothers, manufacturers of propellers, and the Johnson Gear Company. Then through Richmond and over the great Carquinez bridge to Vallejo, calling at the Model Aircraft clubroom. A sixty-mile drive north-east from Vallejo brought us to Sacramento, where we visited the Sacramento Municipal Airport. The West American Air Schools, with Capt. J. W. McCrillis in charge, make this port their headquarters.

SACRAMENTO was our last northern stop. Thirty miles south of Sacramento, directly on the highway, is the Lodi Airport, leased and operated by the Lind Bros. Then, across to the Lincoln Highway, where six miles northwest of Stockton we came to the airport, owned and operated by the Oranges Brothers. The airport has an area of 147 acres, with an oil-treated runway of 2,000 feet into the prevailing wind. The port is equipped with nine small hangars and one hangar accommodating a trimotor transport.

TWENTY-FIVE miles south of Stockton and about one mile east of Modesto, we came to the private airport and the plant of the Aircraft Industries, Inc. A large building, housing the laboratories of the company, is located at the field. The flying field is 1,320 by 2,640 feet, with a runway of 3,000 feet in length. Aircraft Industries manufactures an illuminated wind vane.

THEN, another twenty-five miles, alongside of the highway, is the Merced Airport, owned and operated by Gallison and Tedrow. While at this airport, Mr. Tedrow explained a branch of the aviation industry in which he has two planes employed, that of planting rice by airplane. The process is not unlike crop dusting by plane, except that the fields to be planted are flooded by irrigation.

FOR the next fifty-four miles the country is sparsely settled, but so level that the entire route would make a continuous and safe landing field. Just before entering the city of Fresno, we came to the new Fresno Municipal Airport. In our opinion this is one of the busiest and most prosperous airports in the entire State of California. Only a little over six months old, but for efficiency, daily business and for general activities, I doubt if any of the older airports are keeping pace with it. All of the big airlines plying north and south make it a point of call. A great number of commercial planes make it their base, as well as a number of privately owned planes. The influx of tenants is increasing so rapidly that new hangars are under construction, in addition to a new administration building. George T. Johnson is superintendent of the field. While at the port, two beautiful crop dusting planes of the Aero Corporation of California landed. They are using the airport as headquarters during activities in the San Joaquin Valley, fulfilling contracts.

FIFTEEN miles south of Fresno is the Selma Municipal Airport. Another twenty-five miles brought us to the Visalia Municipal Airport, where steady improvements are being made. A meteorological station has been installed at the port. The Curtis-Wright Flying Service recently started the operation of a flying school at the field.

Nearly seventy miles south, five miles from the city of Bakersfield and three-quarters of a mile east of the state highway, lies the Kern County Airport.

There is scarcely a mile between Visalia and Bakersfield where a plane could not make an emergency landing. This applies to the next forty miles, as far as the start of the grade of the Ridge Route. There is a good field at Lebec.

CALIFORNIA

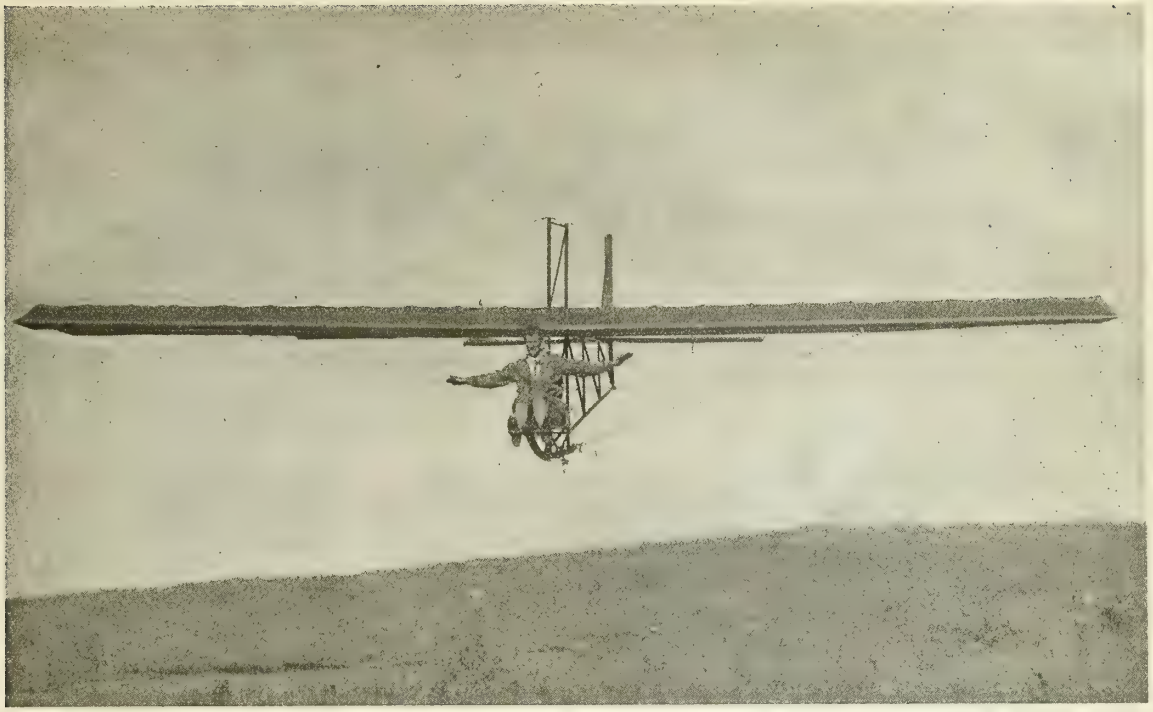
W. B. KINNER, formerly president of the Kinner Airplane and Motor Corporation of Glendale, Calif., has resigned. He is succeeded by Robert Porter, general manager and chairman of the board of directors of the Kinner company for the past year. R. E. Olin, formerly secretary-treasurer, has resigned and W. Wardman has succeeded Mr. Olin as secretary-treasurer. Mr. Wardman was formerly purchasing agent of the Kinner company.

HARRY Y. MAYNARD, former publicity director of the Los Angeles Metropolitan Airport, has announced the establishment of a specialized aeronautic publicity service at Hollywood, Calif. Maynard will contact individuals and organizations of the aeronautical industry and the press and trade publications.

STANDARD FLYING SCHOOLS of Los Angeles, Calif., has established an office on the ground floor of the main passenger depot building of the terminal of the Western Air Express at Los Angeles. The office is for the convenience of students desiring to enroll in the school.

CARL KUHL has been appointed a flying instructor at the Boeing School of Aeronautics, Oakland, Calif. The Boeing school now has five flying instructors, headed by George Myers, former president of the National Pilots' Association.

(*Continued on next page*)



Performance + Durability

Spectacular performance was considered secondary to SAFETY, DURABILITY, and CONTROLABILITY in designing the EVANS primary glider. However, flights have demonstrated its superior performance over other types of gliders. EVANS primary gliders won 7 of the 12 prizes offered at the ALL WESTERN GLIDER MEET in 1929, and again in 1930 EVANS GLIDERS won the Sweepstakes prize from a field of ten competing designs.

EVANS all steel construction—spars and pilot seat being the only wooden parts—makes it exceptionally rugged. Aerotrus steel wing ribs simplify assembly—will not warp or loosen at joints—withstand hard knocks that would shatter wood ribs.

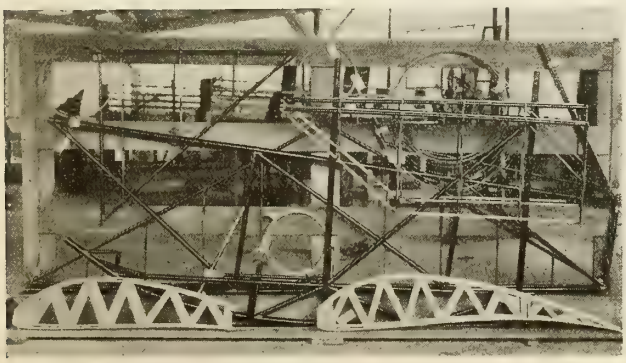
Evans gliders are sold either knockdown or completely assembled. The knockdown glider comes to you complete from tacks to dope—is easily assembled—requires no special mechanical ability—detailed assembly instructions and blueprints with glider. 20% deposit with order required, balance C.O.D. delivery not to exceed 10 days, present schedule 3 days.

SPECIFICATIONS

	Primary	*Secondary*
Span	34 feet	44 feet
Chord	5 feet	5 feet
Length overall	18 ft. 6 in.	21 ft. 6 in.
Weight	175 lbs.	225 lbs.
Area	170 sq. ft.	220 sq. ft.
Spars	Sitka Spruce	Sitka Spruce
Ribs	Aerotrus Steel	Aerotrus Steel
Airfoil	Gottengin 441	Gottengin 441
Fuselage	Aircraft Steel Tubing	Aircraft Steel Tubing
Landing gear	Ash Skid	Ash Skid
Price Knockdown	**$275.00**	**$375.00**
Price Assembled	350.00	450.00

All prices F.O.B. Los Angeles
Double Wire Bracings on both primary and secondary.
Secondary type has streamline enclosed cockpit.
Safety Belts included as standard equipment.

EVANS GLIDER — Knockdown — Ready for Shipment



EVANS GLIDER

"built of steel"

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LOS ANGELES, CALIFORNIA

Qualified dealers are invited to inquire regarding our attractive dealer's proposition.

(California News continued)

THE State Department of Education of California will accept credits earned by a student at the Boeing School of Aeronautics toward the securing of a degree by those who are studying aeronautics for the purpose of teaching, according to a recent announcement of officials of the Boeing company.

AN AID to night flying in the vicinity of Los Angeles, is the recently completed gigantic steel frame Rainbow neon-lighted tower, surmounted by a 50,000,000 candlepower revolving beacon, which was erected for the Bendix Aviation Corporation by the Neale Rainbow Light Corporation on the roof of the new Bendix building, Los Angeles. The tower, which is triangular in shape, reaches a height of 150 feet above the roof. Reading vertically down each of the three sides is the name "Bendix." This is illuminated at night by red Rainbow neon tubing. The letter "B" is twenty-five feet high and sixteen feet wide. The others are eight by ten feet.

ENDORSEMENT of a national campaign urging the establishment of aeronautical courses in high schools and colleges throughout the United States was made at a meeting of the Exchange club of Phoenix, Arizona. Members of the Western Industrial Educational Association attended the meeting.

Educators present at the meeting announced their intention of urging local clubs in eleven western States which they represented, to follow the action of the Phoenix Exchange club.

The aviation courses which State curriculum commissions are urged to establish are non-technical and are concerned principally with the business side of aeronautics.



Aerial view of markings on Bendix Building at night, indicating nearest airport

ON THE roof of the recently erected Bendix Aviation Corporation Building at Los Angeles, Calif., can be seen a new Rainbow neon air marker. The arrow, embodying the figure "9", indicates the mileage and direction to the nearest airport, which in this case is the Grand Central Air Terminal. Also an official Department of Commerce sprocket-shaped air marker, with a star in the center, can be seen. This new type air marker signifies that approved accommodations and service are to be had at the airport designated by the arrow.

At night the arrow, air marker, and figure "9" are illuminated by Rainbow neon tubing. All the luminous tubing employed was installed by the Neale Rainbow Light Corporation, Ltd.

ALAMEDA

[H. V. WALDORF]

THE development program of the Curtiss-Wright Airports Corporation on the western Alameda waterfront has transformed a marshland that covered forty-five acres at low tide into a well developed airport within a period of fourteen months. The airport is known as the Curtiss-Wright Airport at Alameda and has an area of 175 acres. A surface of oyster shell and sand and covered with oil has been constructed. Oiling of 2,000,00 square feet of area was started in May. The north and south cross-runway, 3,000 feet in length, will be completed this summer. When the project is completed there will be three cross-runways.

Work is under way on a $50,000 hangar which will be used by the Curtiss-Wright Flying Service. Other development work includes the clearing of a parking area to accommodate 1,000 automobiles and the construction of a powerhouse to supply current for the airport equipment.

Management of the flying field has been taken over by the Curtiss-Wright Flying Service. Lieut. E. B. Wilkins, operations manager of the flying service, has been appointed field superintendent. Development work is under the direction of Jack Tuyls and C. R. Schwanenberg, engineers.

CHANGES in the personnel of the Curtiss-Wright Flying Service at Alameda Airport have been announced by Capt. Harry Claiborne, division manager. Lieut. E. B. Wilkins has been appointed chief pilot. He succeeds Roy Hunt. Joseph Long has been appointed dean of the ground school and Jack Slaybaugh has been appointed reserve pilot.

CAPT. JOHN A. MacREADY, aviation director for the Shell Oil Company, recently completed a 3,500-mile tour of the Pacific Northwest and Canada. He flew a Lockheed Sirius.

EXPERIMENTAL work on a steam engine for airplanes has been started at an Oakland plant by William J. Besler, son of W. G. Besler, chairman of the board of the New Jersey Central Railroad. The



New Rainbow Neon-lighted tower and beacon on Bendix Building

engine, on which the work of designing has been under way for nearly a year, is of the two-cylinder compound type with the cylinders set at a 90-degree angle. The complete installation, including the boiler for a 150-horsepower plant, weighs approximately 300 pounds. A Curtiss-Robin plane has been purchased by Besler for use in the experimental work.

A flash boiler which operates at 850 degrees Fahrenheit and burns 27 gravity fuel oil will be used. This boiler is built to withstand an internal pressure of 5,000 pounds per square inch. The test engine is rated at 1,500 revolutions per minute. Flight tests will be made this fall.

OAKLAND

[H. V. WALDORF]

TWELVE stewardesses have been appointed to the flying staff of the Boeing Air Transport's San Francisco-Chicago service. They will serve on the crews of trimotor ships. Miss Ellen Church is chief stewardess. Eligibility requirements include age over 25 years and a trained nurse rating.

THE Varney Air Service, with headquarters at Oakland Municipal Airport, has taken the Northern California agency for the Bowlus gliders and sailplanes. Capt. Franklin Rose, recently named vice president of the organization, has completed preliminary arrangements for the establishment of a series of glider training schools throughout the territory.

CAPT. WILLIAM FILLMORE of Oakland Municipal Airport has installed rear view mirrors on his training planes to enable the instructors to learn the students' reaction to aerial maneuvers from their facial expressions.

(Continued on next page)

Announcing the FAMOUS

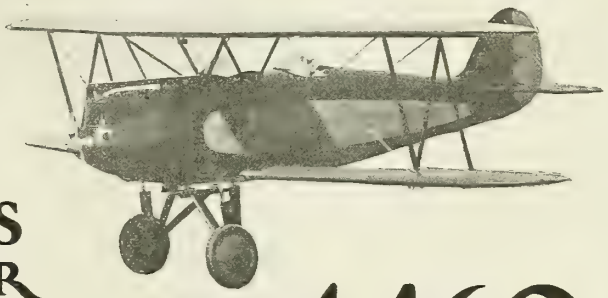
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TRANSPORT PILOT'S COURSE

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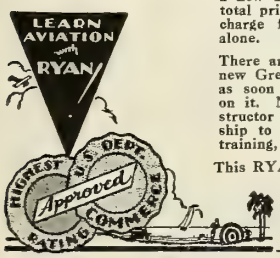
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Analyze the present situation in the business world and in the aeronautical industry and you will find that there is a keen demand for *properly trained transport pilots who own modern airplanes of their own.* In the past, heavy expense has prevented many pilots from receiving both the transport license and a ship. Realizing the necessity of solving this problem, T. Claude Ryan, pioneer aeronautical authority, has for the past year been conducting a series of investigations and tests at Ryan Airport, San Diego. The result is this epochal announcement of "Training—*plus* Plane" Course at a saving of $2,000.00.

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Under this plan you can now receive the famous Ryan Transport (Government Approved) Flying and Ground Training Course, plus a new 1930 Great Lakes airplane, for a total price that is less than some schools charge for a Transport Pilot's Course alone.



There are no strings to this offer. The new Great Lakes plane is issued to you as soon as you enroll. Put your name on it. No one except you and your instructor can fly it. It is your personal ship to be used by you exclusively for training, pleasure or business.

This RYAN "Training—*plus* Plane" plan gives the two great essentials for success: First, the most thorough and complete training available and, second, one of the finest and most efficient modern airplanes with which to capitalize on your investment as soon as your training is completed.

WHAT THIS OFFER INCLUDES

The Great Lakes Sport Trainer is recognized by aeronautical authorities as one of the most dependable of new production planes. Powered with the famous 90 h.p. Cirrus air-cooled motor it develops a top speed of 110 m.p.h. with an upkeep cost of a small automobile. Designed by former Army and Navy aeronautical engineers its pronounced "sweep back" gives it the appearance of an Army or Navy pursuit plane. It is so structurally strong that it holds the World's record for outside loops, and yet so easily is it handled that Ruth Alexander, a RYAN student with only 18 hours of flying experience, used it to establish the World's Altitude Record for Women in Light Planes.

The regular Ryan Transport Course provides 200 hours of flight instruction with 2,000 miles of cross-country flying over mountains, desert and ocean; also the necessary night flying and 10 hours of cabin ship instruction in a Ryan Brougham. With this is included 400 hours of most thorough ground school instruction and all other advantages of training at this world-famous school in balmy San Diego on the edge of the blue Pacific—the home of the United States Government's largest aerial operating force and scene of the country's greatest year 'round flying activity.

A shorter course, plus a Great Lakes airplane, is also available for executives and sportsmen who do not wish the full transport license.

A suggestion: Due to the necessity of ordering each student's plane approximately one month in advance of this training, we suggest making further inquiries immediately to avoid future delay.

☐ CHECK HERE For further information about the RYAN "Training—*plus* Plane" Course.

The T. C. Ryan Flying School invites the attention of those who are interested only in the highest standards of aeronautical training. Ryan Approved Training costs less than training at some schools that have not been approved.

Courses include:

******The Transport Course*	*200 Flying Hours*		*Refresher Courses for Wartime Pilots*
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†*The Private Pilot's Course*	*20 Flying Hours*		*at other schools.*

******These courses include 400 hours of Ground School with Lectures, Laboratory and Shop Practice.*

†*The Private Pilot's Course includes 200 hours of Ground School Training.*

T. C. Ryan Flying School, Dept. T, Ryan Airport. San Diego, California. Please send me your illustrated catalog.

NAME ADDRESS AGE

(Oakland News continued)

FIVE bids for the construction of a mezzanine floor in Hangar 4B at Oakland Airport, to provide an additional 6,000 square feet of space for the Boeing School of Aeronautics, have been received by the board of port commissioners. The lowest bid was $4,450.

WITH the exception of a small area near the northwestern boundary, the filling program of the Oakland Municipal Airport is virtually completed, according to engineers of the board of port commissioners. The filling program was started three years ago.

THE Aero Club of Northern California held the first annual air show at Oakland Municipal Airport May 11.

TRANSPORT planes operating from Oakland Municipal and the Curtiss-Wright Airport at Alameda carried a total of 2,457 passengers during April. Of this number, 1,171 were outbound, and 1,286 inbound. This is approximately an increase of 20 per cent over the previous month. Oakland airport traffic figures for the month were as follows: Landings, 8,611; student flights, 6,743; passengers carried, including those on taxi flights, 3,951.

The traffic figures of Curtiss-Wright Airport included 466 inbound transport passengers; 411 outbound; 147 cross-country flights by the Curtiss-Wright Flying Service, on which 234 passengers were carried; and 500 flights by the twenty-seven members of the Oakland Flying Club.

PLANES of the Naval Air Reserve Squadron at the Oakland Municipal Airport have been equipped for bombing and machine gun practice, under orders of Lieut-Comdr. F. B. Connell, commanding officer.

CAPT. IENAR ELM has taken the Northern California agency for the Great Lakes planes and has established headquarters at Oakland Municipal Airport.

TESTS of speed boats in transporting the air mail between Oakland Municipal Airport and San Francisco are being made by officials of the Post Office Department. Boats of the Western Water Taxi service are being used. Automobile and ferry boat transportation has been used for several years, this method requiring approximately one and one-half hours. The speed boat trip requires a half hour.

BALLOONS illuminated by a small flashlight are being used at the Oakland Municipal Airport to obtain wind observations during the night. A parachute, which opens when the balloon bursts in the rarified atmosphere, lowers the flashlight equipment to earth. D. M. Little designed the equipment.

HANS KIRCHNER has organized the Scenic Skyway Company, which will operate an air taxi and sightseeing service in the vicinity of Lake Tahoe in the Sierra Nevada mountains on the California-Nevada border. Land and seaplanes will be used.

ARIZONA

[H. G. WILSON]

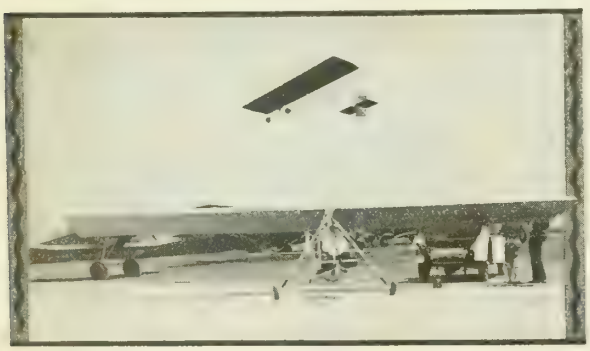
WORK of mapping and leasing airports in South Arizona for the Government lighted airway is continuing under the direction of Grant N. Berryman, airways extension superintendent of the U. S. Department of Commerce, who recently replaced L. C. Elliott. A chain of fields thirty miles apart and beacon lights ten miles apart will soon mark the southern transcontinental airway.

ALL bids for the construction of a hangar at Fly Field, Yuma, were turned down when it was found that all exceeded the amount available for this work. New specifications have been drawn. Of a bond issue of $25,000, made available during the fall of 1929, $12,000 has been expended.

A GLIDER club is being organized at Kingman, in the northern part of the state. Eleven men were present at the first meeting, held April 25 in the passenger depot of the T.A.T. line. When twenty members are secured, the group will be permanently organized.

APPROXIMATELY $20,000 of the $25,000 recently made available by a bond issue for improvement of the municipal airport at Tucson has been expended. An administration building, containing waiting room, baggage room, lavatories, ticket office

(Continued on next page)



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With landing wheels, $300
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EVERYTHING for the glider. Turnbuckles, 15c; cloth, 30c yd.; dope, $1 per gal.; wire, 40c lb.; govt. spec. caseined 1/32, 1/16, 1/8 plywood, 32c sq. ft.; aircraft bolts, pulleys, control cable, safety belts, etc., at comparatively low prices.

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Highest grade $7 helmets, $3.75. $5 helmets, $2. Protector goggles, $5.50. D. H. clincher or straight-side wheels, $8. Small turnbuckles, 15c. Cloth, 30c yard. Dope, $1 a gallon, container and shipping, 50c extra.

Champion, A. C., and various makes of spark plugs, 25c. Safety Belts, $2.25. 7, 8, 9, 10 and 12 cyl. Scintilla magnetos at half price. Govt. Spec. Plywood 1/32, 1/16, 1/8, 32c sq. ft.

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The Russell *"Lobe"* type of Parachute has only 1/3 the opening shock, or strain, of other types of parachutes.

The special cotton material used in Russell *cotton canopy* Parachutes is fully 2/3 as strong as silk. This means that the Russell *cotton* Parachute is more efficient, or has a greater FACTOR OF SAFETY, than other types of parachutes constructed of silk.

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THE RUSSELL "LOBE" PARACHUTE with a *cotton* canopy is a safe parachute at a sensible price. The Russell "Lobe" Parachute with a *silk* canopy has many superiorities over other parachutes on the market—and costs no more than other types.

Whether you purchase a cotton or a silk Russell "Lobe" Parachute, you get the new comfortable pack, with adjustable harness and back-pad which enables you to fasten and unfasten the parachute while seated in the cockpit. All Russell "Lobe" Parachutes are convenient, safe—and remarkably comfortable.

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(Arizona News continued)

and restaurant was completed during May, in addition to the installation of floodlights, boundary lights, a new beacon and illuminated wind cone. The balance of the money available will be used to develop the surface of the field.

FOUR Aeronca monoplanes have been purchased by John H. Harrison, general manager and president of Sky-Tek, newly organized flying school at Phoenix. Several gliders will be purchased by the school, which is operating at Sky Harbor.

A GLIDER club for adults, the Cactus Gliders, has been formed in Tucson. The Tucson Glider Club, the first club formed, is composed chiefly of high school boys.

WASHINGTON

THE lights on the 1,100-mile airway between Los Angeles and Seattle, over which Boeing System recently started night flying with passengers on the northbound trip, will be supervised by a crew of mechanics. They will be provided with motor trucks equipped with spare parts and tools for taking care of practically any service or emergency repair job. Each beacon will be checked at least twice a month. Caretakers will be stationed at the emergency landing fields located at intervals of thirty miles along this course.

FIRST flight tests of the "Monomail," the new Boeing Model 200, a low-wing all-metal monoplane, have been completed, according to a recent announcement of officials of the Boeing Airplane Company, Seattle, Wash., manufacturers of the plane. The Monomail is powered with a 525-horsepower Pratt and Whitney Hornet engine and has a payload of 2,000 pounds. Upon the completion of the preliminary flight tests and approval by the Department of Commerce, the airplane will be tested by Boeing Air Transport under operating conditions.

The plane is provided with retractable landing gear and a special Boeing nose cowling. Although the plane is of monocoque construction, full longerons have been used as added bracing. A new type of instrument board, patented by Gene Johnson of Pacific Air Transport, is standard equipment.

[C. M. LITTELJOHN]

PASSENGER service between Seattle and Alaska has been resumed and seven-passenger Lockheed Vega cabin planes have been placed in operation on this route by the Alaska-Washington Airways. During the next six months the Airways company will maintain twice-a-week service between Seattle, Ketchikan, and Juneau, Alaska.

THE Air Express Agency was recently incorporated at Seattle by A. F. Slater, L. Fred Lundy and W. G. Barbour.

THE Omak, Washington, airport, will be developed in the near future and a large hangar will be built. Trees will be planted by the Omak American Legion Post.

A FLYING boat for sportsmen will be produced commercially by the Universal Aircraft Corporation of Seattle, capitalized at $90,000, which was recently incorporated. The factory of the company is located on Minor Avenue. H. D. Chambers, formerly of the Curtiss-Wright Corporation, designed the ship. Porter Sligar is general manager of the company.

TRUSTEES of the Spokane Chamber of Commerce are favoring a rate of taxation for the Spokane Airport based on a moderate ground rental, an aviation gasoline tax and a percentage charge on net profits.

IMPROVEMENTS costing about $10,000 will be made at the Chehalis Airport. Beacon lights were recently installed at the field.

PLANES operated on the Seattle-Alaskan route by Alaska-Washington Airways are being equipped with radio. Low wave sending and receiving sets will be provided and will be effective over a range of 1,500 miles.

(Continued on next page)

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16,000 MILES OF DAILY SCHEDULED FLYING

WESTERN AIR EXPRESS announces the opening of its new passenger line between El Paso and Dallas, bringing the total of its daily scheduled flights to more than 16,000 miles. The new line affords alternate routes between Dallas and Los Angeles . . . one via Amarillo and Albuquerque and the other via El Paso. Western Air Express is daily fulfilling its pledge to create a network of air transport lines adequate to serve the growing needs of the great West and second to none in the world.

The full story of its immense facilities can be obtained from leading hotels, travel bureaus, steamship and railway ticket offices or direct from Western Air Express offices in all principal cities from Kansas City west and in St. Louis (New Hotel Jefferson), Cleveland (214 Hippodrome Bldg.), Chicago (Palmer House) and New York (Graybar Bldg.)

WESTERN AIR EXPRESS

(Washington News continued)

IMPROVEMENTS have been started at Boeing Field, Seattle's municipal airport. Obstructions are being eliminated, runways are being constructed, and the landing field is being extended in both directions. An illuminated wind indicator has been installed at the field.

AIR WEEK was recently observed at Seattle. Ceremonies included flying exhibitions by planes, and the dedication of the administration building at Boeing Airport.

UTAH

[G. PERRINS]

PREPARATIONS are under way for the extension of the Western Air Express line from Salt Lake City, Utah, to Cheyenne, Wyoming, and from Salt Lake City to Butte, Montana, and Pasco, Washington, with the transcontinental lines in Salt Lake paralleling the Boeing Air Transport line from Salt Lake to Cheyenne.

AIR lines now converging at Salt Lake are the Western Air Express, Inc., from Los Angeles and the Southwest; Varney Air Lines, serving the Pacific Northwest, and the National Parks Airways, extending to Montana. Passengers may now travel between Salt Lake and Portland in seven hours. The air mail service has also been speeded up following the lighting of airways. A total of 2,000,000 miles have been flown by planes over the Varney air line between Salt Lake and the Northwest during the past four years.

A CELEBRATION commemorating the installation of lighting equipment at the Ogden Airport was held May 1. Mayor Ora Bundy made a daylight inspection and later gave a talk by means of a special microphone and amplifying arrangement. The ceremonies were held at night. The field will be fenced with barbed wire 1,070 feet long in the near future. Additional lights will be installed, increasing the total number of lights at the field to sixty-six. The field is 200 acres in extent.

PAYSON, UTAH, recently had an aviation and field day celebration at its new airport. Governor George H. Dern was present. The program included a parade featuring the evolution of transportation, band concerts, an aerial exhibition, parachute jumps, a race between a motorcycle and an airplane, track meet and games. Arrangements for the construction of a hangar have been completed.

IDAHO

[G. PERRIN]

THREE new emergency fields and a municipal airport in Southern Idaho will be completed soon, according to a recent announcement of A. C. Blomgren, State aeronautics engineer. Mr. Blomgren recently made a survey of landing field sites between Mountain Home and King Hill, Jerome and Burley, and between Burley and American Falls. City officials of American Falls recently started negotiations to establish an airport on Government lands near the city.

CONTRACTS for the lighting of airways from Pocatello north to Great Falls, Montana, will be let by the Government prior to July 1, according to G. R. Fitzgerald, of the Department of Commerce, Aeronautics Branch, who will supervise the installations. The air mail line from Salt Lake to Pocatello has been lighted. Beacon lights north to Great Falls will be installed every ten miles.

BUHL, IDAHO, has acquired land near the city where an airport will be developed. Present plans include the construction of two runways, one east-west, and the other north-south.

NORTHWEST

[F. K. HASKELL]

THE Oregon State Glider Club, recently organized at Corvallis, Oregon, has a limited membership of twenty-five. An order has been placed with the Marvin A. Northup Airplane Company for a glider with a twenty-five-foot wing span capable of carrying a 200-pound passenger. Officers of the club are John M. Gerrish, Portland, president; Ed Johnson, Salem, secretary, and Mathew J. Odell, Portland, treasurer.

THE air circus and meet which will be included in the dedication of the Kelso airport on July Fourth will be sponsored by the National Aeronautic Association. J. A. Pringle and Floyd Hoggatt will constitute the airport committee. The program will include airplane races from Seattle and Portland to the local field.

IN IDAHO, glider clubs have been formed at Boise, Idaho Falls, Pocatello and Coeur D'Alene.

WASHINGTON Air Express, a corporation capitalized at $150,000, has opened offices in the Joseph Vance Building, Seattle, Washington. The offices will occupy a 1,100 square feet of ground floor space, and an equal amount of space in the basement. The basement area will be devoted to the parcel department, where aeronautical equipment, planes, tickets for all airlines in the country, air sightseeing tickets, and plane insurance will be sold.

The Washington Air Express is holding company for Air Express Agency, Inc., and Air Agency, Inc. Officers of the three companies are August F. Slater, president; B. W. Boright, secretary of Washington Air Air Express; W. G. Barbour, secretary of Air Express Agency, Inc., and Dr. L. Fred Lunby, treasurer of Air Agency, Inc.

PURCHASE of the lease of the Everett Airport by the Coast Air Lines, Inc., has been announced. The property includes a large hangar, an administration building and a machine shop. Included in the equipment is a five-passenger Ryan monoplane and aerial photography instruments. Officers of the Coast Air Lines, Inc., include L. H. Rose, president; Ted Nygard, treasurer, and Joseph Matsen, secretary.

CANAL ZONE

[J. F. H.]

THE Isthmian Airways, operators of a tri-daily service across the Panama Canal, have received an eight-place Hamilton all-metal seaplane, increasing their fleet to three. The service, which has been in operation since May 5, 1929, has flown 110,000 miles, carried more than 8,000 passengers and 200,000 pounds of express and baggage.

WORK on the development of a runway at the Panama National Airport, Panama City, is progressing rapidly and will be completed by July. The Pan American Airways recently started construction of a hangar and office building at the field.

A SIKORSKY amphibion will soon be in use at the Naval Air Station at Coco Solo. The plane was delivered by the aircraft carrier *Langley* in March for use by the Coco Solo personnel.

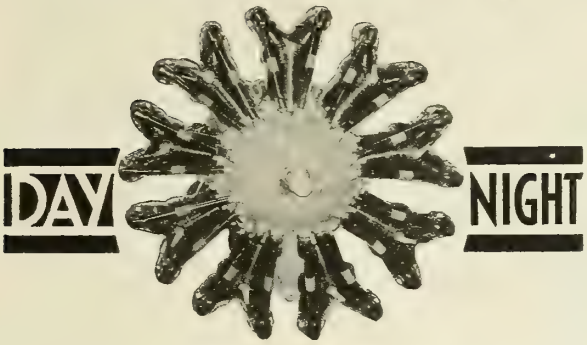
THE pilots of the Army Air Corps at France Field recently completed their spring maneuvers in the interior, basing for two weeks at Anton and Pennonome.

GLIDER enthusiasts are growing rapidly on the Canal Zone. A glider club has been formed and will purchase a glider. The hills flanking the Canal and the adjacent country will be used for gliding instruction by members of the club.



First students to receive pilots' licenses in the Canal Zone. (Left to right) John L. Reese, Rudolfo Estripeaut, Jr., Jack Miller, instructor, Bruce Fox and Robert Marstrand

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Cleveland, Ohio

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AERONAUTICAL INDUSTRY

AERO DIGEST ENTRY IN NATIONAL ELIMINATION BALLOON RACE JUNE 10

AS a concrete expression of its interest in the lighter-than-air phase of aeronautics, AERO DIGEST will be represented this year by an entry in the National Elimination Balloon Race for the Litchfield Trophy. The races will take off from Houston, Texas, on June 10th. Co-pilots of the AERO DIGEST bag will be Capt. Samuel Taylor Moore, Army Air Corps Reserve, and Otto Wienecke.

Capt. Moore is a writer by profession and is now assisting Major Reed Landis in handling publicity for the National Air Races at Chicago. He has been a balloon enthusiast since early 1917 and holds F.A.I. Certificate No. 106. Moore has kept his hand in piloting gas bags on active duty tours with the Army since the Armistice. His last race was in the 1927 national event from Akron when he was forced down in a cloudburst over Lake Oneida, New York State.

The balloon, AERO DIGEST, is being furnished through the courtesy of the Goodyear Tire and Rubber Company and the Akron Business Club. It is the single-ply racing bag usually flown by Ward T. Van-Orman, Goodyear's veteran pilot, winner of several national and two James Gordon Bennett races.

As winner of the 1929 James Gordon Bennett race, Van Orman is automatically the first American entry in the international race, as the cup defender. It will be the first national race he has missed in many years. Because of the fact he will not contest in the national elimination race, only the balloons finishing first and second will qualify for the international race, instead of the first three finishes as usual.

The entries in the National Elimination Balloon Race are as follows: U. S. Navy: Lieut. W. Bushnell, pilot, and Lieut. J. A. Greenwald, aide; Lieut. R. R. Dennett and Lieut. C. F. Miller; Lieut. T. G. W. Settle and Lieut. T. M. Whelan. U. S. Army: Capt. Karl S. Axtater and Lieut. Ralph E. Holmes; Lieut. Walter D. Buie and Lieut. John P. Kidwell; Lieut. William R. Turnbull and Lieut. Courtland M. Brown. Detroit Balloon Club: Svend A. U. Rasmussen and Tracy W. Southworth; Waldemar A. Klikoff and Roy S. Cunningham; Edward J. Hill and Arthur G. Schlosser; Dr. George M. LeGallee and Robert W. Ebert. United Van Service, Inc.: George Hineman and Milford Vanik. AERO DIGEST: Samuel Taylor Moore and Otto Wienecke.

Sergievsky Sets Altitude Record

A NEW American altitude record of 26,000 feet for seaplanes carrying a load of 500 kilograms (1,102 pounds) was established recently by Capt. Boris Sergievsky, chief pilot of the Sikorsky Aviation Corporation, in a flight at North Beach, Queens, N. Y. The flight was observed by officials of the National Aeronautic Association and a sealed barograph placed in the ship at the start of the flight has been sent to Washington, D. C., for official calibration.

Capt. Sergievsky used a Sikorsky amphibion with the wheels on the landing gear removed to conform with seaplane specifications, there being no category of records for amphibion aircraft. The plane was a standard model equipped with superchargers and powered with two Pratt and Whitney Wasp engines of 425 horsepower each.

The flight was completed in approximately one and one-half hours.

American Engineering Council Will Aid Commercial Aviation

THE American Engineering Council will act as a consulting body for the development of commercial aviation, and thirty national organizations comprising the council will aid the aeronautical industry in the solution of technical, operating and safety problems, according to a recent announcement of officials of the organization. The society has a membership of over 60,000 engineers who will engage in a program of aeronautical research, the results of their studies being disseminated through the United States Department of Commerce, Bureau of Aeronautics.

Among the first tasks proposed by the council are the formulation of fundamental principles which will serve as a guide in the selection, design and operation of airports and airways, and the organizaton of a program of research to develop more efficient airports and operation methods.

Members of an airport committee which has been formed by the council include Prof. Ralph J. Fogg, head of the department of civil engineering, Lehigh University, chairman; Perry a Fellows, W. W. Horner, Dr. Harrison E. Howe, H. G. Shirley, and Prof. Alexander Klemin. Carl E. Grunsky is president of the American Engineering Council.

MEARS PLANS WORLD FLIGHT IN JUNE

JOHN HENRY MEARS and Fred Melchior expect to start early in June on an airplane flight around the world in an effort to break the record of the *Graf Zeppelin*. Melchior will be the pilot and navigator, and Mears will operate the long range radio. Mears expects to obtain his pilot's license before the take-off, and relieve Melchior at the controls on the 19,000-mile journey.

The record of the *Graf Zeppelin*, established in 1929, Lakehurst to Lakehurst, is twenty-one days, eight hours and twenty-six minutes. The previous record, established in 1928 by Mears and the late Capt. C. B. D. Collyer, using plane and steamship facilities, was twenty-three days, fifteen hours and twenty-one minutes. In 1913, Mears circled the earth by plane, train and ship in thirty-five days, breaking the record established by Henry Yagerschmidt.

The route of the projected flight is scheduled as follows: Roosevelt Field, New York; Harbor Grace, Newfoundland; Valencia, Ireland; Southampton, England; Berlin, Germany; Moscow, U.S.S.R., Nova-Silvisk, Siberia; Chita, Siberia; Khaborovsk, Siberia; Petropavlovsk, Kamchatka; Seward, Alaska; Seattle, Wash., to Roosevelt Field, with a stop en route at some halfway point in the United States. Fuel will be taken on at all stops. At Berlin the instruments will

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be checked by Gosta Halwardson, service man for the Pioneer Company.

Mears and Melchior will use a Lockheed Vega on the flight. The ship is a standard production model. Approximately $3,000 was spent for alterations and special equipment, including Pioneer earth inductor compass. Complete the plane cost approximately $21,000. Mears expects to spend $40,000 on the flight. The ship is powered by a Pratt and Whitney engine of 425 horsepower. Gas capacity is 450 gallons, which is expected to keep the plane in the air for eighteen hours and permit a cruising range of 2,700 miles. Their mascot will be a Sealyham terrier, Tailwind II.

CONDUCT TESTS OF BURNELLI X-3

PERFORMANCE tests of a variable chord, camber and flap action wing that has been reduced to practice have been started by Roger Wolfe Kahn. The plane equipped with the wing and used in the tests was built under the original patents obtained by Vincent J. Burnelli and is a one-third model of a trimotor transport incorporating the all-wing construction of the Burnelli type. The final design of the ship will be based on the experimental data obtained by Mr. Kahn. The plane is known as the Burnelli X-3.

On the first test flight Mr. Kahn piloted the plane from Keyport, N. J., to Roosevelt Field, L. I. He took the plane off a rough runway in four seconds. During the first day's flights, the plane was in the air for more than three hours and a number of take-offs and landings were made. Mr. Kahn used the variable wing in all its positions and landed with good control at less than thirty miles an hour.

Dr. Prandtl Awarded Guggenheim Medal

THE second award of the Daniel Guggenheim medal for notable achievement in aeronautics has been made to Dr. Ludwig Prandtl of the University of Goettingen, Germany, according to a recent announcement of Dr. Alfred D. Flinn, secretary of the Guggenheim Fund for the Promotion of Aeronautics. The award was made in recognition of the improved designs of wing sections and other aeronautical experimental data compiled by Dr. Prandtl since 1904.

A.S.M.E. AERONAUTICAL MEETING, DAYTON

TWENTY-SEVEN papers were presented at the Fourth National Technical Aeronautic Meeting of the Aeronautic Division of the American Society of Mechanical Engineers held at Dayton, Ohio, May 19-22. The program of activities included inspection trips through the Wright Field laboratory which were made in the afternoons. Morning sessions were held at the Hotel Biltmore, and two evening sessions were held at the Dayton Engineers Club.

The program was arranged so that any part of or the entire session might be attended according to the amount of time available, and the papers presented were selected for their value to engineers and executives engaged in aeronautics. In addition, the program emphasized the contributions of the aeronautical industry toward the development of new methods in materials of importance to mechanical engineers and the machinery industries.

The staff at Wright Field contributed several papers describing experiments which have been conducted at the field; the work of the Department of Commerce was represented by a paper on the silencing of airplanes; and the Navy Department contributed papers on control at low speeds, and the problem of fire hazards in aircraft.

The opening session of the meeting of the society was held at the Hotel Biltmore, Dayton. A paper entitled, "What the Airplane Can Do in Central and South America," by Roy Wright, was presented at this session. The paper is a survey of the possibilities of the airplane in Central and South America and describes the development in aeronautics in progress. Carl B. Fritsche presented a paper on the "Economic Aspects of the Rigid Airship," analyzing the commercial competition of rigid airships with other forms of transportation, and the economic possibilities of the airship on commercial and military bases.

An airplane production symposium was held in the auditorium at Wright Field in the afternoon. Four papers were presented at this session as follows: "Airplane Design, Manufacture and Sales, Commercial vs. Military," by Rex B. Beisel; "Design of Airplanes from Point of View of Cheap Production," by Russell F. Hardy; "Reduction of Airplane Production Costs," by J. Don Alexander; and "Production Methods in Airplane Construction," by R. S. Damon. A special meeting of general interest was held in the evening at the Dayton Engineers Club.

A session devoted to the discussion of airplane design was held at the Hotel Biltmore on the morning of May 20. The papers presented were as follows: "German Metal Airplane Construction," by Prof. Herbert Wagner; "Airplane Wing Trussing," by Richard Mock; "Engineering Organization in the Airplane Factory," by E. Malloy; and "The Design of Giant Flying Boats," by Dr. Claude Dornier.

In the afternoon a session on fuel and lubricants was held at Wright Field, the following papers being presented: "The High Performance of Gasoline Aircraft Engine

(*Continued on page 167*)

FLIES GLIDER 15 HOURS 13 MINUTES

AN UNOFFICIAL world's glider endurance record of fifteen hours and thirteen minutes was established on April 30 by Jack Barstow in a flight at Point Loma, San Diego, Calif. The record will remain unofficial, as a baragraph was not installed in the sailplane, the rules of the F.A.I. requiring the use of this instrument in the establishment of an official record.

Barstow used a Bowlus sailplane. He took off at 12:44 p.m., on April 29 and landed at 3:57 a.m. on April 30, within approximately 1,500 feet from the point of take-off. The flight was witnessed by William Van Dusen, representative of the National Aeronautic Association.

The official world's glider record of fourteen hours and ten minutes was established in Germany in 1928 by Ray Schultz. The official American glider record of nine hours, five minutes and thirty seconds was established by William H. Bowlus last March in a flight at Point Loma, using a Bowlus sailplane. The record established by Barstow exceeds the previous unofficial world's glider record of fourteen hours and forty-five minutes, established recently in Germany by Lieut. Dinert.



(Left) Jack Barstow taking off at Point Loma, Calif., in a Bowlus Sailplane on a flight of 15 hours 13 minutes, establishing the unofficial world's record. (Right) Barstow and Clyde Freeman, vice president of the Bowlus Sailplane Co.

THE JUNIOR COAST-TO-COAST FLIGHT

By FRANK GOLDSBOROUGH

MY ROUND-TRIP, transcontinental flight was not a "stunt." I had a definite object in view, and I think I have achieved it. I wanted to prove that an average boy, efficiently trained, can handle an airplane today with as much confidence and ability as the seasoned pilot.

The future of aviation rests directly upon the shoulders of the boy of today. We are growing into it while our elders are growing out of it. I think that there should be no obstacle placed in the path of the boy who desires seriously to take up aviation as his life work. On the contrary, every encouragement should be given him. Likewise the boys of today who as men of tomorrow will be the support of the industry through their patronage should have instilled in them the assurance of safety, comfort and pleasure which a knowledge of aviation brings.

When I conceived the idea of my flight I faced all kinds of difficulties. I had used my savings in completing my flying course. I had no ship. All I had was the ambition, and this carried me along until I won the confidence and faith of Fred L. Foster, the aviation manager of the Richfield Oil Corporation of New York. The Richfield people took up my problems for me, and the first thing I knew everything was ready for the hop-off. They had helped me persuade the Fleet people to let me use a Fleet biplane, the same ship used by Mrs. Keith Miller in the women's air races. This is a Kinner-motored job, and handles beautifully. With my plane ready, the Richfield company arranged to fuel it for me on the entire trip.

On Monday, April 28, I took off from Westfield, N. J., arriving at Los Angeles the following Sunday, my total elapsed flying time being thirty-four hours and three minutes. This established the first junior east-to-west record.

My trip west was marred by one accident. I had come down in the desert about 100 miles east of El Paso. It was getting dark, and I spied the lights of a car. I landed beside a truck carrying two "wildcat" oil prospectors, and spent the night with them. I had trouble taking off the next morning, when a gust of wind caught me and pushed me against a telegraph pole, damaging my right wing. I got off with it, and was then held up at El Paso for a day while temporary repairs were made. A new wing was ordered for me at Los Angeles. I kept to my course all the way out with no trouble at all.

In Los Angeles I was received by the Richfield company, and was the guest of C. M. Fuller, president of Richfield, who honored me at a banquet attended by about 500 company officials, aviation leaders and prominent persons in Los Angeles. Mr. Fuller saw that everything was arranged for me out there and treated me royally.



Frank Goldsorough, Junior transcontinental record holder

The Kinner people overhauled my motor and Thursday, May 8, I hopped off for home. The return trip was fine. I had tail winds for a good bit of the way, and was able to break my own transcontinental record landing at Westfield Sunday afternoon, May 11, after twenty-eight hours elapsed flying time. The former west-east junior record was forty-eight hours, established by Dick James, and I had clipped twenty hours from it.

I had succeeded. I proved that a pilot's age meant nothing, but that training meant everything. Thousands of boys in all parts of the country are as anxious to fly as I was, and I am going to devote myself to seeing that they get a chance really to know aviation.

N. A. C. A. CONFERENCE AT LANGLEY FIELD

COMPARED to the advances that have been made during the past two years by the the radio and motion picture industries, aviation, from an engineering standpoint, has been stagnant, according to W. B. Stout, head of the Stout Engineering Laboratories, Inc., in an address at the Fifth Annual Aircraft Engineering Research Conference held May 12, under the auspices of the National Advisory Committee on Aeronautics at Langley Field, Va. Grover Loening, in an address to the conference, declared that the principal developments needed in aircraft construction are variable pitch propellers and silencers for airplane propellers and engine exhausts.

"Aeronautical engineers during the past two years," Mr. Stout said, "have been more interested in the market quotations on their stocks than in building new types of airplanes. None of us are building the plane today that the public wants.

"We must take a tip from the radio and the motion picture industries. During the past two years these industries have junked practically all of their old models and brought out an entirely new product. If the airplane industry is to make a profit it must do practically the same thing—throw overboard the old planes and bring out a plane that the public wants.

"We must make planes simpler and easier to operate. We must build a plane that is operated by one control. Either the rudder or the ailerons must go. The plane must be so simple that a man who has never been in an airplane before can buy one on Friday night and fly it away Monday morning with the entire aquiescence. of the Department of Commerce.

"The airplane of two years from today will be so different from the planes of today that there will be no comparison. It will have a different power plant. The landing gear, if it has one at all, will be different. Thanks to what we are learning from gliders, it is highly probable that the planes of two years hence will have no landing gears at all. Such a plane will have different controls and be short on gadgets and long on flying qualities. The wing spread will be much less than is the case today.

"In addition, this new plane must be so attractively constructed that the man who never flew one, upon seeing it, will exclaim 'Gosh, that's pretty! Wrap me up half a dozen!'

"Anybody can build a plane that will fly. What I want to see is a man build a plane that won't fly and then keep eternally after it until he makes it fly twice as successfully as any plane has flown before.

"Airplane engineers must get off the beaten path, build their planes simpler, display real ingenuity, take some chances and show some real sportmanship. When that day comes the world will see a real revolution in aviation."

Mr. Loening declared that aviation has suffered more from slogans than any other industry. "I sometimes think," he said, "that 'air-minded' must mean nothing but air from the eyebrows up. The future of aviation does not lead toward simpler planes if by this term one means the discontinuance of appliances which tend to make for safety. No one will question the statement that brakes and starters have contributed much to the modern airplane.

"Two of the chief needs of aviation today are silencers for propellers and engine exhaust, and variable pitch propellers."

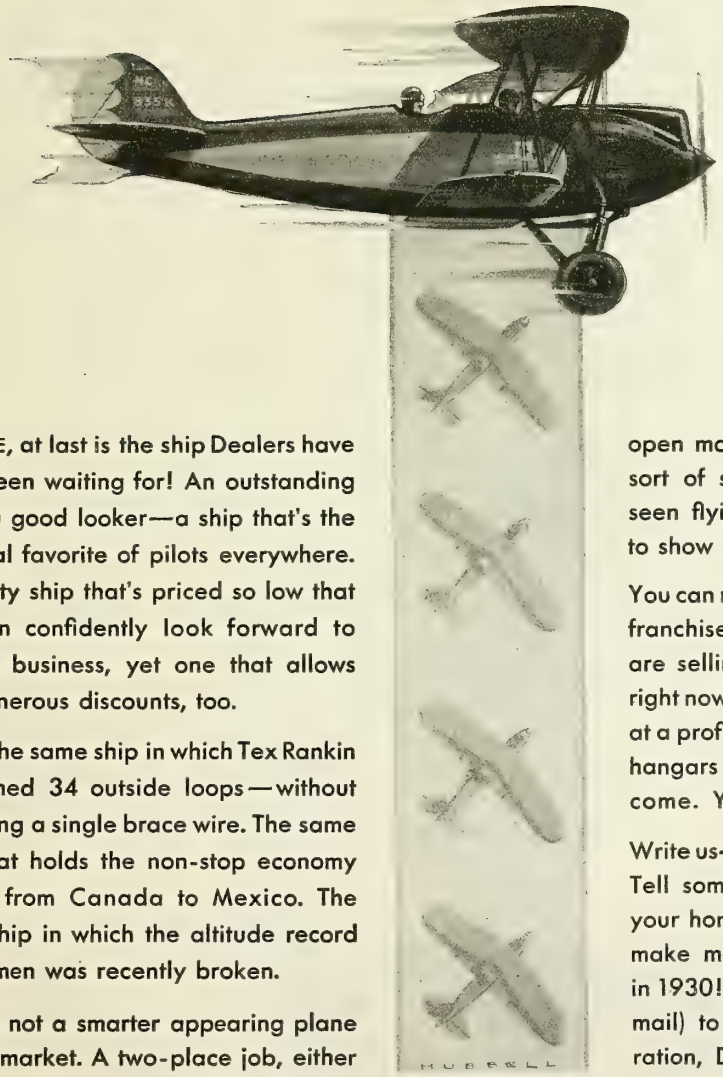
Mr. Loening suggested that the N. A. C. A. laboratories devote their attention to actual flying tests rather than experiments with models and wind tunnels.

Included in the discussions at the conference were pusher type propellers, development of the floating aileron to combat spinning, tests with changes in the shape of the fuselage, changes of position of the power plant, and new type windshields.

Doctor Joseph S. Ames, chairman of the N. A. C. A. presided at the conference.

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LIGHT AIRPLANES REDUCE FARE AND FEAR

By CONRAD G. DIETZ
General Manager, Aeronautical Corporation of America

SOMEONE made the statement that aviation is being retarded by two things—Fare and Fear.

Leaders in the industry have been acquainted with this terse conclusion for a long time and they have tried to create something which would push both obstacles into the abyss which contains the fears of early automobile days and the economic disadvantages of many other pioneering ventures.

Cost is probably the most important drawback of the average man's flying. There are millions in this country who are what we call "air-minded." Given half a chance, the greater percentage of these millions would fly if the cost did not put too much of a strain on the bank roll. As proof of this contention, take a glance at the increase in air transportation as soon as the fares dropped down to within shouting distance of railroad rates. Take a further look at the crowds jostling each other while waiting their turn on "dollar-hop" day at any airport.

This same condition applies just as aptly to the private airplane market. If automobiles were confined to the $3,000 and up figure, our highways would be seldom used. For every one person that can afford to drive a $3,000 car, there are a hundred enjoying the pleasure of cars costing less than $1,000. The $2,000 difference represents a huge difference in earning capacity.

Until something was done to bring the cost of private planes down to a figure which was within the means of millions, the personal ownership of a plane was destined to be a rich man's pleasure.

The largest market for aircraft is in the "employee" market. To quote the Hon. Clarence M. Young, "this group constitutes men and women who work eight hours a day and six days a week; who have little money and less time. With the development of the automobile to prices within their reach, they turned to it as their chief means of recreation in the limited idle hours available. A large number now want to acquire and employ the airplane for the same purpose, but how to learn to fly and become plane owners on small incomes and with only short periods of leisure has been the problem both for this group and the industry is well. The obstacle between the buyer and the seller has been the prices that the buyer could not meet and the seller could not fix."

In an attempt to open up this vast market, not only to ourselves but to everyone in the industry who can profit by the far-reaching effects of its exploitation, we gambled five years of intensive experimental work, which gave us the solution to one problem and then started us on the road towards knocking the other into a series of outside loops. Our resources put us in a position to manufacture a well-constructed finished ship at a cheap rate.

We set out to build a plane which the average man could fly safely, and buy easily.

What factors were necessary to evercome both the inherent fear of going aloft, planted so solidly by the instinct of self-preservation, and the even more unconquerable problem induced by the per capita wealth (or lack of wealth) of the air-minded enthusiast? In short, what type of plane would be considered ideal for private flying, not only by the wealthy sportsman, but chiefly by the hundreds of thousands who want to fly but could not afford such an exalting recreation either physically or financially?

Our answer, first, is a plane which could be purchased cheaply and maintained at a reasonable price, and in the second place, a plane at which the average man would take about two looks and then decide that he could fly it.

In the first classification a price not exceeding that of the kind of automobile these men drive had to be attained. The initial cost alone could not be considered an adequate solution to this price problem. Of what good is a low-priced airplane to the average man, if it consumes eight or ten gallons of fuel an hour.

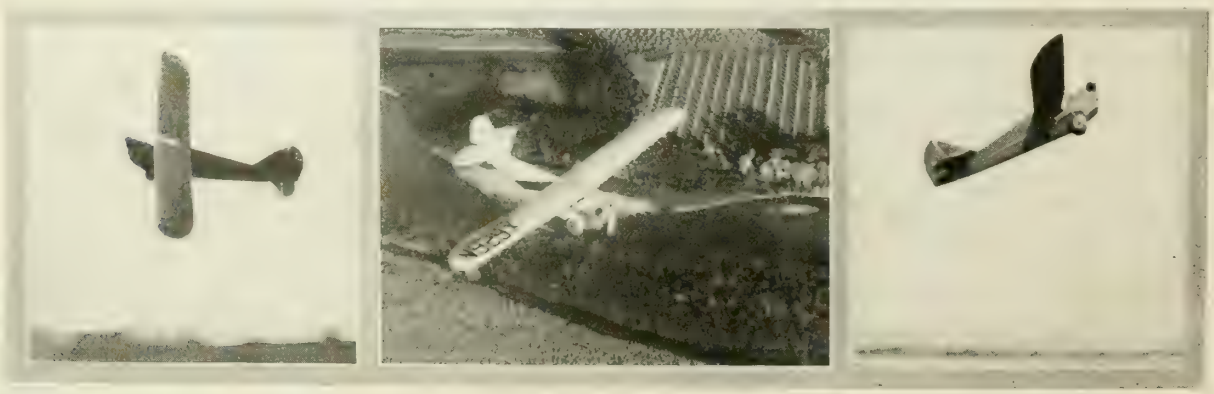
Under the second head—safety and confidence—the really difficult part of this two-fold job had to be faced. For years the industry has tried to whip this "fear" bugaboo.

A really practical private plane, therefore, must have stability, inherent stability, stability on take-off, in landing, in maneuvering, in fair weather, in high winds—stability under any condition it might encounter. This stability must be so pronounced that the plane will always right itself—whether it's upside down, in a vertical bank or zooming with the nose pointing at the skies above with the motor off.

In addition to this inherent stability, our private planes should have a high speed of at least 80 miles per hour. This maximum speed is essential because it is uneconomical to fly at top speed continually. Fuel consumption at top speed is much higher and the engine depreciates more rapidly. By reducing this maximum speed ten or fifteen per cent, we still have better than 60 miles an hour which is much faster than one could travel safely on the ground.

For the amateur flier, the landing speed should not be more than thirty-five miles per hour. Low speeds lessen the shock of a poor landing and reduce the danger of a crack-up. Then, too, this low landing speed guarantees a lower stalling speed in the air and a shorter take-off. The seventy, sixty and forty-foot runways we use for the Aeronca make large fields look rather extravagant.

Gliding angle is another important feature. If the plane is to be safe in the hands of our "employee" market, it must not demand a lot of hurried attention when the motor coughs a bit. They'll be much safer if if they can soar around a while and decide what to do and also where to do it. The eleven to one gliding angle we have in Aeroncas gives a fellow a chance to glide around the neighborhood and land wherever he chooses. This gliding characteristic explains how we have achieved economy. The thirty-horsepower motor gives this ship a performance that is spectacular and yet it handles just like a glider when the motor has a few minutes off. This does not mean, though, that we build a glider. The Department of Commerce is too eager with its sandbags to let us even think of that. When we specify a six and one-half safety factor, we've got to build a real airplane.



The Aeronca C-2 in flight. This ship is a light monoplane powered with a thirty-horsepower engine and has a gliding angle of eleven to one. Produced by the Aeronautical Corporation of America

Talking About Speed!

BY

E. B. GALLAHER

Treasurer, Clover Mfg. Co.

Editor, Clover Business Service

You know, rabbits *think* they are some runners; but, when the colored Deacon, walking through a graveyard one dark night, was startled by a white object jumping out at him, he started to run down the road—Mr. Rabbit right in front, but not going fast enough to keep out of the way, the Deacon yelled out, "Git one side there and let a fellah run w'at KIN run."



I can't help getting a good laugh at the expense of the bunch who have been yelling their heads off about the alleged "speed" of certain water-mixed valve compounds, and the "passing" of grease mixtures; **for, now come the long-awaited Government findings and specifications, dated May 1st, 1928, governing future purchase of abrasive compounds and knocking all this bunk into a cocked hat.**

The Government, after months of laboratory work, finds (1) **that the fastest cutting compound is a grease mixture, which cuts $3\frac{7}{10}$** times faster than any other; (2) that the cutting speed is entirely dependent on the quantity of **truly graded** grains; (3) that the grease binder is so superior to the water-mixed binder that (4), **in the future only grease-mixed compounds will be used, and no water-mixed compounds will be bought.** Going some? But, after all, it is quality that always decides in the end.



If you haven't used the latest developments in Clover Grease-Mixed Grinding and Lapping Compound, you had better get next—**we** have always known there was nothing faster—a million mechanics will tell you that quality of work cannot even be approached with anything else.

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CURTISS MARINE TROPHY RACE

THE eleventh annual Curtiss Marine Trophy Race, in which Navy and Marine Corps pilots annually compete in a one hundred mile speed contest with service seaplanes, was to be held May 31, at the Naval Air Station, Anacostia, D. C.

Twenty-six entries had been approved by the Navy Department on May 15 and the National Aeronautic Association which received the trophy from Glenn H. Curtiss. Included in the entries is Lieut. W. G. Tomlinson who won the race last year when he established a speed of 162.5 miles per hour, using a Curtiss Sea Hawk.

The race is held over a closed circuit of five laps of twenty miles each. The seaplanes are divided into five groups: fighting planes, observation planes, amphibions, torpedo planes and training planes. A second trophy is awarded for points scored on a basis of efficiency, to be presented by D. S. Ingalls, Secretary of the Navy for Aeronautics.

Second Annual Airport Conference at Hotel Statler, Buffalo, N. Y.

THE Second Annual Airport Conference was held at the Hotel Statler, Buffalo, N. Y., May 14-16 under the auspices of the Aeronautical Chamber of Commerce. Included in the program of the conference were meetings of ten committees, each committee having been assigned to the study of an important problem in the establishment and maintainance of an airport.

Activities at the conference were devoted to the meetings and reports of these committees May 14-15; sessions of the delegates May 15-16; and an exhibition of airport equipment which was held at the Buffalo Municipal Airport in the afternoon and evening of May 16. The exhibit at the airport included demonstrations of lighting equipment during the evening. A display of aeronautical manufacturers was held at the Hotel during the conference. The conference banquet was held on the evening of May 15 and was in addition to informal luncheons and dinners held throughout the three-day session.

The committees which convened and reported to the conference were as follows:

Accounting, E. A. Johnson, chairman; Hangar Construction, Major Frank M. Kennedy, chairman; Surfacing and Drainage, T. R. Newell, chairman; Servicing and Storage, Maj. R. W. Schroeder, chairman; Sales and advertising, R. F. Craig, chairman; Lighting, Maj. John Berry, chairman; Seaplane and Amphibion Bases, Andrew Heermance, chairman; Traffic Handling, C. W. Short, chairman; Concessions, Woodruff De Silva, chairman; Small Town Airport, Frank L. Bertschler, chairman.

INFORMATION concerning the relatives of Freddie Kohler, who accompanies Mrs. Grayson on the attempted transatlantic flight in the *Dawn*, is being sought by Mrs. J. E. Kelly, Benevento Plantation, Alberta, Va. Mr. Kohler visited the plantation previous to the flight, and left property including a scrap book of photographs which Mrs. Kelly desires to return to Mr. Kohler's relatives or heirs.

COMING AERONAUTICAL EVENTS

May 30-June 8. Pennsylvania State Air Tour, sponsored by the Aero Club of Pennsylvania and Pittsburgh Aero Club.

June 2-7. Northwest Aircraft Exposition, Coliseum midway between Minneapolis and St. Paul, Minn.

June 3. Eastern Ontario Air Meet, Kingston, Ontario.

June 3. Second Annual Field Day of Ottawa Flying Club, Ottawa, Canada.

June 10. National Elimination Balloon Race, Houston, Texas.

June 10-15. Celebration of 25th Anniversary of the F. A. I., Paris, France.

June 12-13. Michigan State Conference on Airports. Traverse City, Mich.

June 16-22. Third All-Iowa Good Will Air Tour.

June 20-21. Dedication of Randolph Field, U. S. Army Air Corps Training Center, Randolph Field, Texas.

June 21-22. Dedication of the Allentown Airport, Allentown, Pa.

June 28-July 6. Pacific Coast Aeronautical Exhibition, sponsored by Capt. Bill Erwin Post, American Legion, and the Aeronautical Chamber of Commerce, Oakland, Calif.

June 28. Annual British Royal Air Force Display, Hendon, England.

June 30-July 1. Third National Model League of America Contests, Detroit, Mich., auspices *American Boy Magazine*.

July 3-5. Western States Aeronautical Conference, Medford, Oregon.

July 4. Dedication of Kelso, Wash., municipal airport.

July 6. Beginning of International Transportation Exposition, Poland.

July 10-19. Second Annual Michigan Air Tour, auspices Pontiac Board of Commerce.

July 20. Start of "Challenge de Tourisme Internationale" from Berlin-Tempelhof Airport, Berlin, Germany.

July 21. Start of All America Flying Derby for American Cirrus powered planes from Detroit, Mich. Sponsored by American Cirrus Engines, Inc.

August 8-17. Great Lakes Air Cruise, auspices Detroit Flying Club.

August 9-24. International Gliding Meet, auspices Rhoen-Rossiten Gesellschaft, East Prussia, Germany.

August 18-20. National Air Parley, sponsored by the Air Law Institute, Chicago, Ill.

August 23-September 1. National Air Races, Chicago, Ill.

August 30-September 1. Dedication of the Williamson-Johnson Airport, Duluth, Minn. Postponed from July 4-6.

September 1. James Gordon Bennett Balloon Race, Cleveland, Ohio.

September 1. First Annual Thompson Trophy Race, Chicago, Ill.

September 1-6. Fifth International Air Congress, The Hague, Holland.

November 27-December 14. Aeronautical Salon, Paris, France.

December 10-23. International Congress of Aerial Security, Paris, France.

PRIVATE PILOTS IN NATIONAL RACES

RACES open to private pilots will be included in the program of events of the 1930 National Air Races, Chicago, Ill, August 23 to September 1, according to a recent announcement of R. W. "Shorty" Schroeder, chairman of the race committee. These events will be in addition to the general group of Army, Navy and civilian races which include the cross-country derbies and the closed course events.

The daylight flying activities of the National Air Races will be supplemented with night events which will include bombardment by Navy planes of a village erected on the field, and displays of fireworks.

Restricts Altitude of Flight Over High Explosive Danger Areas

FLYING over high explosive danger areas will be restricted to a minimum altitude of 1,000 feet under an amendment to the Air Commerce Regulations recently announced by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

The amendment reads as follows: "Exclusive of taking off from or landing on an established landing field, airport or on property designated for that purpose by the owner, and except as otherwise permitted by Section 79, aircraft shall not be flown over Certified High Explosive Danger Areas except at a height sufficient to permit of a reasonably safe emergency landing outside of the certified danger area, which in no case shall be less than one thousand feet."

ZEPPELIN CROSSES SOUTH ATLANTIC

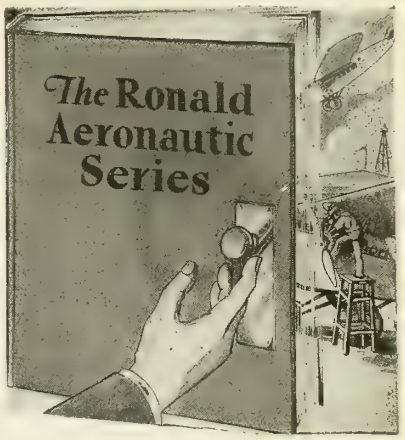
THE *Graf Zeppelin* arrived at Pernambuco, Brazil, on May 22, after a flight of 4,000 miles from Seville, Spain, completed in sixty-one hours. The flight was the first made by the zeppelin across the South Atlantic, and was the longest over-water leg of a journey from Friedrichshafen, Germany, to Lakehurst, N. J., via South America.

The flight of the *Graf Zeppelin* across the South Atlantic was made to determine the meteorological conditions prevalent on this route, and the feasibility of establishing an airship service between Berlin, Germany, and Buenos Aires.

The airship left Friedrichshafen at 11.18 p. m. (Eastern Standard Time), on May 18, and landed at Seville, Spain, at 12.40 p. m., on May 19; left Seville at 3.30 a. m., on May 20; and moored at Pernambuco at 6.05 p. m., May 22.

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Less than half of the books now ready are listed below. Those described show a quality of authorship and content that is thoroughly representative of the complete series.

Practical Flying

by Major B. Q. Jones, Air Corps, U. S. Army. **210 pages, 6 illustrations, $3.00**

This manual is a time-tested statement of what to do and what not to do in flying. First, Major Jones, famous as the Chief of Army Aviation Training during the war, describes the qualities desirable in a pilot. Then follow chapters on planes, instruments, technical and slang expressions, plane parts, pilots' equipment, methods of plane inspection, and rules for testing the controls and the motor. Then Major Jones tells you all about the actual technique of taxying, the take-off, climb, straight flight, turns and banks, glides, recognizing and correcting for stalls in their early stages, and for getting out of spins. The book throughout stresses safe flying by the observance of commonsense, practical rules.

The Navigation of Aircraft

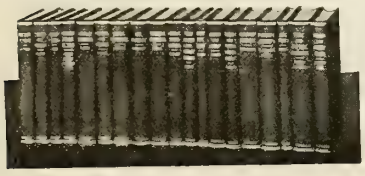
by Lieut. Logan C. Ramsey, U. S. Navy; Instructor, Naval Air Station, Pensacola, Fla. **237 pages, 51 illustrations, $4.50**

This book is a practical discussion of the aerial navigation actually used in ordinary, everyday flight. It sets the proper balance between the three branches of avigation—piloting, dead reckonirg, and aerial astronomy—something no other book accomplishes. In addition to its major presentation of the principles and practice of position finding by calculation and observation, it covers fully the mechanical aids of navigation; navigational procedure in practice; general advice and equipment; blind flying; application of weather reports and data to navigation; etc.; etc. Although very recently published, this manual has already been selected by many leading schools as the one book on aerial navigation satisfactory for their students.

Airplane Mechanics Rigging Handbook

by R. S. Hartz, formerly Lieut. Colonel, Air Corps, U. S. Army; and E. E. Hall, Lieut., Air Corps Res. **267 pages, 104 illustrations, $3.50**

Licensed mechanics and men who want to qualify for this important work will find all the practical details of their job covered fully in this manual. The authors have had years of experience in Army and civilian flying schools. They show you just how to get an airplane into flying condition and how to keep it that way. The instructions are given in detail, covering the care and inspection of airplanes; dismantling an airplane; stresses and strains; four methods of rigging; sequence of rigging steps; truing up the fuselage, the center section, and the wings; adjusting the angles of incidence, dihedral, etc.; overall adjustments; spars and struts; splicing and fitting; controls and corrections for instability; practical hints for riggers; inspections; installation and correction of compasses; etc.; etc.



Aircraft Power Plants

by E. T. Jones, formerly Chief Engineer, Wright Aeronautical Corporation, and other experts. **208 pages, 104 illustrations, $4.25**

Written for students, pilots, and engineers who need information on engine principles; a frank discussion of their favorable and unfavorable features; the performance characteristics that may be expected; and a description of engine accessories.

The book explains and compares performance characteristics of engines and accessories. Points out adaptability for various purposes with practical notes on their operating features. The various kinds of heat engines are clearly explained and compared without going into thermodynamic formulas. The section on propellers includes engineering formulas and plan-forms sufficient for design of ordinary types. Sequence of operations necessary in design computations included. The accessories described include ignition systems, carburetors, fuel piping, pumps, reduction mechanisms, superchargers. Valuable information is given on lubrication and quality of engine fuels.

Aircraft Instruments

by H. N. Eaton and other experts of the Aeronautic Instruments Section, United States Bureau of Standards. **269 pages, 68 illustrations, $5.00**

For students, pilots, mechanics, engineers and designers. The only book of its kind in America. Describes over 175 types of aircraft instruments—practically every kind in use—giving a summary of their operation, advantages and disadvantages of each, practical advice on installation, care, and manipulation.

Covers thoroughly classifications; transmission systems; instrument boards; altitude and climb instruments; air and ground speed instruments; direction, position, and altitude instruments; power plant instruments; manometers; navigating instruments; specifications; etc., etc.

Simple Aerodynamics and the Airplane

by Charles N. Monteith, Chief Engineer, Boeing Airplane Co.; 3rd edition revised by Colonel C. C. Carter, U. S. Military Academy, West Point. **418 pages, 211 illustrations, $4.50**

A completely revised and enlarged edition of a famous introductory textbook widely used in ground and flying schools, in colleges, technical schools and universities. It is ideally suited to home-study use.

Includes a general discussion of airplanes; characteristics and types of airfoils; explanations of lift and drag; center of pressure and its movements; plotting of coefficients and characteristic curves; distribution of forces; selection of airfoils; rate of climb; landing speeds; combining air foils; parasite resistance; characteristics of aircraft engines; discussion of component parts of an airplane; stability considerations and its attainment; control surfaces; the propeller; airplane performance; dynamic loads, maneuverability and controllability; structural considerations; wind tunnels; discussion of airplane types for specific performance; methods and instruments for navigation of aircraft; airplane accessories; parachutes; radio; aerial photography; etc.; etc.

Airplane Stress Analysis

by Alexander Klemin, Professor of Aeronautical Engineering, Daniel Guggenheim School of Aeronautics, New York University. **277 pages, 105 illustrations, $7.00**

In this introductory treatise, Professor Klemin shows step by step how to make all the calculations in the airplane stress analysis required by the Department of Commerce. The book is intensely practical—each point is explained with the utmost clearness and simplicity; advanced mathematics has been avoided so far as possible. To show the reader just how the calculations are made in actual practice, Professor Klemin takes an airplane of average characteristics and gives full examples of all the computations required. A preliminary review explains the principles of applied mechanics involved. In concise, easily usable form, data on materials of aircraft construction to which the calculator must frequently refer, are assembled for convenient reference.

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NEW YORK

A CONTRACT has been signed by the American Aeronautical Corporation, New York, with Commercial Investment, Trust Inc., under which the commercial company will be the official financing organization for the dealers and distributors of the American Aeronautical Corporation. The contract includes the financing of all wholesale and retail installment sales made throughout the United States and Canada and includes sales made direct by the manufacturer to large users such as airline transport operators. The American Aeronautical Corporation manufactures seaplanes, flying boats and amphibions known as the Savoia-Marchetti.

A DISPLAY salon for aircraft has been opened at 1782 Broadway, New York City, by the C. T. Stork Corporation. The show room will contain a permanent exhibit of large and small planes of various types, engines, parachutes and other aeronautical accessories. Miss Morrilla del Carveth, general manager of the C. T. Stork Corporation, will be in charge of the salon.

FREDERIC G. COBURN, president of the Aviation Corporation, has been elected president of American Airways, Inc., a division of the Aviation Corporation, according to a recent announcement of officials of the Aviation company. Mr. Coburn succeeds Mr. James F. Hamilton as president of the Airways company.

C. A. PATTERSON, president of General Airplane Corporation of Buffalo, N. Y., recently announced the sale of a three-place cabin Aristocrat, powered with a Continental A-70 engine to W. R. Hall, director of the motor vehicle division of the Borden Company. The ship will be used as a service plane in the maintenance of the Borden fleet of 18,000 trucks located in various parts of the United States.

AIR Associates, Inc., has signed a contract with the Hamilton Standard Propeller Corporation for the distribution and service in New York of steel propellers made by the Hamilton company. The Hamilton company is a subsidiary of the United Aircraft and Transport Corporation. According to the contract, Air Associates will carry in stock all types of Hamilton steel propellers in addition to pitch setting, balancing, straightening and etching equipment.

FLOYD SMITH, inventor of the Floyd Smith Safety Chute, has organized the Floyd Smith Safety Chute Company, with offices located at 528 Genesee Bldg., Buffalo, N. Y. Mr. Smith is president of the company. The company has acquired factory facilities for the production of the parachutes.

FREDERIC G. COBURN, president of the Aviation Corporation, has been elected president of the Fairchild company, subsidiary of the Aviation Corporation. Mr. Coburn succeeds C. S. Reed, who has resigned and will devote his entire attention to a business in the Middle West. Mr. Reed will continue as a member of the board of directors of the Fairchild company.

REGULATIONS governing aircraft in New York State are contained in a statute passed by the legislature recently and which will take effect July 1. The statute establishes rules for right of way, acrobatic flying, use of parachutes, taking off and landing, and altitude in addition to regulations of signal lights. The legislature authorized an appropriation of $40,000 to continue the commission which is investigating aviation within the State and developing a system for the communication of weather reports.

CENTRAL NEW YORK

[C. M. MARVIN]

A GROUP of students of Cornell University have organized a glider club, known as the Cornell Glider Club. Members will purchase a glider from the Eastern Aeronautical Corporation, according to Shernan Voorhees, sales manager of the company.

THE Syracuse Glider Club has completed plans for activities this summer. The organization is open to men eighteen years of age or over, and will be divided into groups as the membership grows. Reinhold R. Schempp will head the first group. Schempp is a glider pilot, having learned in Germany. Sponsors of the first group are Jack Herrick and F. A. Fillingham. A. G. Spaulding and Bros. stores at 357 S. Warren St., Syracuse, have been designated as the headquarters of the Club. The Syracuse Branch, Curtiss-Wright Flying Service, in W. Genesee St., is the downtown headquarters. Members of the club are attending ground school at the present time.

COOPERATING with the Eastern Greyhound Lines, Inc., including Colonial Lines, Empire Air Transport will furnish air transportation out of Syracuse for bus patrons, according to a recent announcement of Emil Roth, Jr., vice president of Empire Air Transport.

THE new Cortland Airport on Groton road was recently opened. The work of improving the port was supervised by Lieut. Harold R. Mull. The field has been graded and seeded and the runways are being improved. Lieut. Mull is a former pilot for General Aviation Company of Syracuse.

BUFFALO

[A. SHEPHERD]

PREPARATION of detailed plans and specifications for the first unit in the development of the Buffalo Marine Airport was begun recently, following a conference between city officials and the airport advisory board. A double hangar, concrete runway, ramp, and small administration building will be constructed at a cost of about $300,000. The Airport Advisory Board will study the development of a seaplane base and further improvement of the Municipal Airport, with a view to preparing a five-year expansion program.

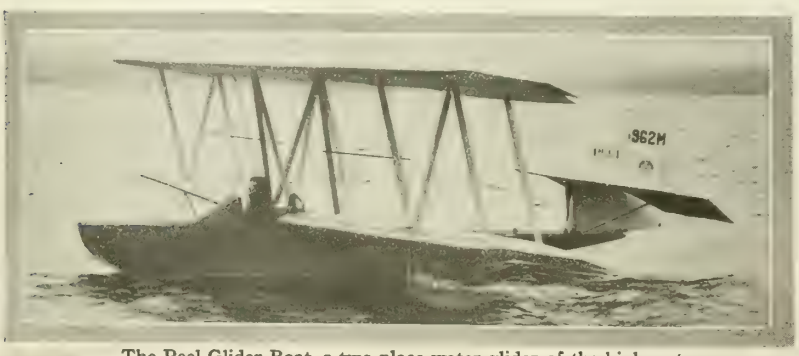
FIFTEEN members of the *Buffalo Evening News* Branch of the Airplane Model League of America, were passengers recently in a Curtiss Robin, at the invitation of the manager of the Curtiss-Wright Flying Service.

GEORGE WAITE, president of the Irving Air Chute Company, who recently sailed for Europe, said before leaving that production would be started in the Bridgeburg, Ontario, plant in the next few weeks.

PRODUCTION has started in the new plant of Fleet Aircraft of Canada, Ltd., in Fort Erie, with the manufacture of the Fleet Model 2 sport plane for land and water use. The plant will manufacture the sport plane exclusively the first year.

FOUR graduates of the Curtiss-Wright Flying School recently flew cross-country in new Curtiss Robin planes to Lincoln, Nebraska. Pilot J. Lees Eddy was in charge of the flight.

THE Advisory Board of the Municipal Airport discussed four airport problems at a recent meeting, including hangar rentals, gasoline tax, liability insurance, and operation at an airport of approved schools only.



The Peel Glider Boat, a two-place water glider of the biplane type

RHODE ISLAND

[T. F. BRESNAHAN]

THE Curtiss-Wright Flying Service has announced the abandonment of its base at the What Cheer Airport, Pawtucket. Planes and other equipment have been removed to other fields operated by the company. The lease of the field held by the company has two years more to run, the annual rental being $2,500 per year. According to the terms of the lease, the Curtiss company, if it does not sell, must keep the field in perfect flying condition and the hangar and other equipment in repair.

The What Cheer Airport accommodated twenty-nine of the Navy planes participating in the recent air maneuvers over New York and New England. The remainder of the planes participating landed at airports at Boston, Mass., Pawtucket, R. I., and Hartford, Conn.

THE Woonsocket Airport recently opened. Dick Holihan is chief pilot.

NEW JERSEY

THE New Standard Aircraft Corporation of Paterson, N. J., which has been operating on approximately sixty per cent of normal production during the early spring, increased production May 1st, according to a recent announcement of officials of the company. Deliveries on all models are fifteen to twenty-one days behind orders, according to George Daws sales manager.

AMERICAN Airways, Inc., has purchased 100,000 gallons of Stanavo aviation engine oil for delivery during the next twelve months period, according to a recent announcement of officials of the Stanavo Specification Board, Inc. American Airways is a subsidiary of the Aviation Corporation.

AN increase in the weight and payload of the New Standard training plane has been authorized by the Department of Commerce, Division of Aeronautics, according to a recent announcement by officials of the New Standard Aircraft Corporation of Paterson, N. J., manufacturers of the plane. The gross weight of the ship will be 1,790 pounds in comparison with the previous total of 1,610 pounds, increasing equipment and baggage allowance by 180 pounds.

MARYLAND

[E. W. WALSH]

WILLIAM H. Miller, chief of research of the Berliner-Joyce Aircraft Corporation, of Baltimore, Md., will act in an advisory capacity for the Baltimore Glider Club which was recently formed.

W. W. MOSS, president of the Berliner-Joyce Aircraft Corporation of Baltimore, Md., and Temple N. Joyce, one of the vice presidents of the corporation, recently completed a flight from Baltimore to Los Angeles, Calif., and return. The trip required ten days.

CONSTRUCTION of the XFJ-1 fighting plane, built for the United States Navy by the Berliner-Joyce Aircraft Corporation was recently completed and the plane has been shipped to the Naval Air Station, Anacostia, D. C., where it will be flight tested. The ship is a two-place biplane of monocoque construction. The upper wing is on the same plane as the top of the fuselage, giving the pilot full vision; the lower wing is placed just above the wheels and is a few feet from the ground. The plane is equipped with machine guns and small bombs.

A second plane, the XP-16, which is being built for the Army by the Berliner-Joyce concern, was to be completed May 20. The ship is a two-place biplane.

A VISIT to the plant of the Berliner-Joyce Aircraft Corporation, was made during the first official meeting of the Baltimore Chapter, Society of Automotive Engineers, which was recently organized. The organization has sixty-two members. The visitors were divided into groups and shown through the plant by engineers connected with the aircraft manufacturing concern after which they were escorted to Logan Field, nearby, where a considerable number were taken on airplane hops.

THE Tenth Annual aircraft exhibit of the Flying Club of Baltimore, Md., was held at Logan Field, May 30-June 1. Included in the program of events was an aerial exhibition by planes of the Air Corps and the National Guard.

The planes exhibited included the Curtiss Tanager and the Travel Air Mystery S.

PENNSYLVANIA

[R. GARD]

THE Tri-State Aircraft Show was recently held in the Convention Hall in Camden, N. J. More than 10,000 attended the show, according to the management. The exhibition will become an annual affair. The date of the 1931 Tri-State Aircraft Show will be April 10th to 18th.

PHILADELPHIA was treated to a unique air spectacle on May 22nd, when the entire Pacific air fleet of the Navy landed at the Navy Yard Field. One hundred and fifty-six planes, comprising ninety single-seated fighters, thirty-six twin bombers, and thirty O2U-2's, landed at Mustin Field, remaining for three days. After the stop, the fleet, which came from its base at San Diego, Calif., flew to Washington.

(Continued on next page)



The Whittelsey Avian built in the United States by the Whittelsey Manufacturing Company of Bridgeport, Conn.

(Pennsylvania News continued)

The object of the flight to Philadelphia was to test the adequacy of the Philadelphia Navy Yard to handle a great number of planes in time of emergency.

A GROUP of young women, headed by Mrs. Sylvia A. Nelson, recently held a meeting to discuss plans for the formation of a gliding club with membership open only to women.

A CITY Bureau of Aeronautics will be established to supervise the development of the Philadelphia Airport at Hog Island, according to a recent announcement of Mayor Mackey of Philadelphia.

PITTSBURGH

THE Hamilton Standard Propeller Corporation, division of the United Aircraft and Transport Corporation, recently announced the receipt of an order for 300 Hamilton Standard propellers for the Stinson Aircraft Corporation of Detroit, Michigan. The Hamilton Standard Propeller Corporation has recently moved into its new plant at Pittsburgh, and has booked new and replacement orders sufficient to require its full normal capacity.

CONSTRUCTION of an experimental airplane wing which will be static tested to destruction upon completion has been started by the Pittsburgh Metal Airplane Company of Pittsburgh, Pa. The wing is constructed of metal and is designed to decrease the number of hours required to construct a wing.

[Bob Coates]

THE Path of the Eagle, a passenger air transport service operated by Cliff Ball, operator of the Cleveland-Pittsburgh mail line, and Pennsylvania Air Lines, has been merged with the mail line and the Pennsylvania company. A Ford trimotor operated by the Pennsylvania lines will be operated on the Ball Cleveland-Pittsburgh-Washington line, with stops at Akron, Youngstown and Beaver Falls. Mr. Ball has been named president of the combined companies. Arthur Ball, secretary and treasurer, and W. C. Smith, former president of the Pennsylvania Lines, will serve as directors. R. Park Marshall will be vice president and a director of the merged organization. A new schedule of lower rates will be inaugurated.

THE P. A. I. C. and the Main Aeronautics Company have purchased gliders and will operate them at their respective fields. The West Pennsylvania Glider Association has been organized, sponsored by the P. A. I. C. Students at the Pittsburgh School of Aviation have organized the Pittsburgh Glider Club.

THE Pittsburgh School of Aviation has been purchased from R. V. Trader by the Main Aeronautics Company. The downtown class rooms will be retained and flying instruction will be given at the Pittsburgh-Greensburgh Airport. Mr. Trader will continue with the school as director. Pilots E. Q. V. Henriques and Richard Copeland will head the staff of flying instructors. Waco, Ryan and Avians will be used.

A RESTAURANT and filling station have been erected at the Bettis Airport, operated by the Curtiss-Wright Corporation. The buildings are of the same architecture as the hangar and administration buildings.

LOUD speaker equipment, radio weather reporting apparatus and a tea-room with hotel facilities have been installed at the Pittsburgh-Butler Airport, operated by the Main Aeronautics Company, under the management of E. J. Lauth.

OHIO

REORGANIZATION of the Willard Storage Battery Company of Cleveland, Ohio, was recently announced by R. C. Norberg, president of the company. The reorganization is included in an expansion program adopted by the Willard company. Stanley E. Baldwin, former advertising manager, has been appointed director of merchandising and will have charge of the advertising and renewal sales divisions. F. G. Teufel has been appointed renewal sales manager. Clifton C. Andrews, formerly assistant to Mr. Baldwin, has been named advertising manager and will direct the foreign and domestic advertising activities of the Willard company.

A. FRANCIS ARCIER has been appointed chief engineer and designer of the Waco Aircraft Company of Troy, Ohio. Mr. Arcier was formerly engineer and designer for Handley Page, Limited, Fokker and General Airplanes Corporation.

HARRY M. RUNKLE, president of the International Derrick & Equipment Company of Columbus, Ohio, has announced the purchase of the Leidecker Tool Company of Marietta, Ohio. The plant of the Leidecker company will remain in Marietta and the present organization will be retained. The company will continue to operate under the name of the Leidecker Tool Company.

COLUMBUS

[W. Donald Walter]

THE United States Weather Bureau Station at Port Columbus has been opened. The bureau will occupy the two rooms in the administration building formerly used by T.A.T. The station is handled by a staff of three men, and will furnish twenty-four hour service. Weather data will be sent and received from a number of similar stations by means of teletype.

THE 308th Observation Squadron, Air Corps Reserve, is planning a systematic training program for the summer months. This squadron is based at Norton Field. Major William F. Centner, commanding officer, presided at a squadron meeting held at Port Columbus on May 2nd.

THE radio beacon being erected by the Department of Commerce at Port Columbus will be one of five installed along the New York-St. Louis air mail route. The others, according to advice received here, will be located at Harrisburg, Pittsburgh, Terre Haute, and St. Louis. These beacons, combined with the weather reporting service previously mentioned, will afford pilots flying over this route the most up-to-date facilities for safe operation.

NORTON FIELD'S three PT's and one O-11 were flown to Cleveland over the week-end of April 25th and 26th, to be used in connection with training of Reserve officers in that district. Practically all pilots checked were found competent to solo, and the ships were flown seventeen hours, exclusive of the time consumed in ferrying them up and back.

HAROLD DISTELHORST and K. F. Steele, have been sworn in to act as aerial deputy sheriffs attached to the office of Sheriff Harry Paul of Franklin County. They will use a Whirlwind Waco owned by C. Leon Morris, president of the Aero Club of Columbus, which Mr. Morris has placed at the disposal of the sheriff's office. Enforcement of air rules and regulations of the State of Ohio, the Department of Commerce, and the municipality will be delegated to the new flying deputies.

INSTRUMENTS to test the efficiency of the drainage system have recently been installed at Port Columbus, and tests are being run. A rain gauge is located on the roof of the administration building and recording devices are placed in the control tower. At the outlet of the drainage system on the north side of the field there is a meter to register the flow; from the readings of the two gauges observers are enabled to determine the percentage of drainage, as well as the time required to drain the field after any given precipitation.

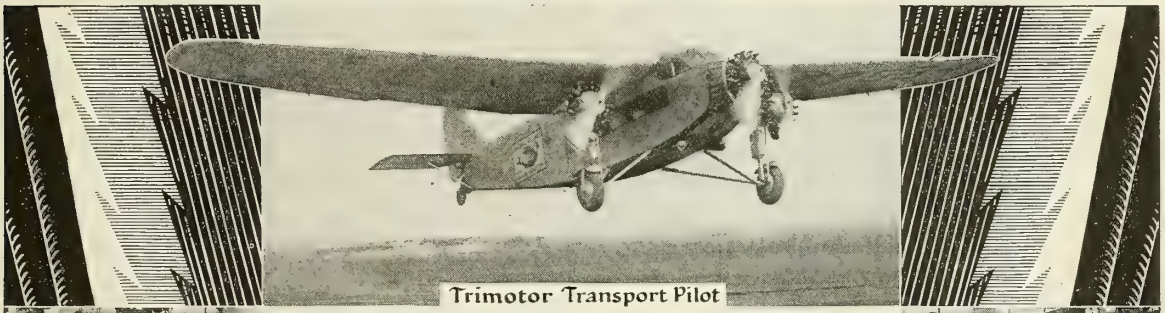
RESERVE officers from Norton Field who have recently flown to Fairfield for semi-annual physical examinations, include Major Tabor, Bluefield, West Virginia; Capts. Phil Williams, John Davis, and Harold Sites, and Lieut. Ross Aukerman of Columbus. In accordance with Air Corps regulations, Lieut. McConnell accompanies Reserve officers on such flights.

CURTISS-WRIGHT pilots at Port Columbus are wearing new uniforms. They are similar to the former aviation uniforms of the Marine Corps. The roll-collar blouses have wide patch pockets and a small pair of gold wings is worn on the left breast. Slacks and a cap resembling the overseas design complete the outfit.

COLUMBUS was host during April to Major Georges Thenault, former commanding officer of the Lafayette Escadrille. Maj. Thenault, who is now air attaché at the French embassy in Washington, represented his government at ceremonies of the

(Continued on next page)

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(*Ohio News continued*)

presentation of colors by the War Department to the 372nd Infantry.

MAJOR TABOR of the Air Corps Reserve, drives three hundred miles at regular intervals from his home near Bluefield, West Virginia, to Norton Field, to take advantage of the flying facilities afforded the Reserve here. Major Tabor is attached to the 308th Observation Squadron.

SHERIFFS and prosecuting attorneys of Ohio's eighty-eight counties were invited by John M. Vory's, Director of Aeronautics, to attend a conference at Port Columbus on May 7th, for the purpose of discussing Department of Commerce and State laws and regulations governing air traffic. About one hundred and fifty officials attended the meeting. In addition to discussion and expansion of existing laws, the program included an inspection of Port Columbus and demonstrations of flying. Many of the delegates attending the conference flew to Columbus.

ALTHOUGH official figures are not yet available, the Reserve flying time at Norton Field during April surpassed all other months since the field was opened. The month's total is somewhere around 140 hours, and we expect May to set a new record.

MICHIGAN

THE Second Annual Michigan Air Tour will be held July 10-19, according to a recent announcement of the Pontiac Board of Commerce, sponsor of the event. A stop will be made at Grand Rapids and pilots participating in the tour will contest in the events which will be held in conjunction with the West Michigan Air Fair on July 12-13. The tentative itinerary of the tour covers ten days and two stops a day will be made.

[K. F. ZEISLER]

THE work of surveying Michigan from the air will continue this summer with the aerial mapping of Mackinac, Schoolcraft and Delta counties. The work is under the supervision of the Department of Conservation, the Highway Department and the U. S. Geological Survey, and will provide accurate photographic maps of Michigan's forest and recreation areas. Three counties were mapped last year and the work will be continued for several years, the total cost of $53,000 being shared equally by the State and Federal Governments. Army Air Corps planes and equipment will be used, and the shots will be taken from an altitude of 10,000 feet.

Kellogg Airport at Battle Creek

KELLOGG AIRPORT, Battle Creek, Michigan, privately owned and operated, is rapidly progressing toward first class requirements. The field is owned by William E. Kellogg, with the city having an option to purchase in 1933, and is operated by the Kellogg Airport Association in conjunction with the Chamber of Commerce. The field is 2,200 by 2,400 feet and is 140 acres in extent. The landing area is sodded. Lighting equipment consists of a 3,000,000-candlepower beacon, a revolving beacon and boundary lights. Flood lighting equipment will be installed this year. Erection of a steel hangar at a cost of $3,000 was recently completed. A clubhouse which contains the living quarters of Randolph Russell, airport manager, is available to visiting pilots.

Air transport companies operating at the field include the Thompson Aeronautical Corporation and Stout Air Lines, Inc. Two schools are operated at the field—the Battle Creek Flying School, supervised by Lieut. Max Hayden and Kieth Moon, formerly of the Air Corps; and the Davis and Felix School, headed by Norman Wood and E. S. Beadle. The Battle Creek school uses American Eagle planes and the Davis and Felix school operates Curtiss Robin ships. Gliding instruction is given by the latter school and by Addison Hill, a private pilot.

MICHIGAN'S Naval Reserve Unit has received a new landing field from a Detroit real estate company. The field is located at Tecon Lake, sixteen miles from Grayling, location of the summer camp of the Michigan National Guard. Hangar facilities for three planes and grading of the field will be supervised this year by the Royal Oak Flying Club, operators of a field and a coöperative flying school at Royal Oak, near Detroit.

WISCONSIN

[W. SCOLLARD]

ANNOUNCEMENT has been made that the licensing by the State of all schools teaching aviation will be recommended to the legislatures of eight of the nine states that were represented officially at the Mid-West legislative air parley held in this city recently. The delegates of Wisconsin, Michigan, Ohio, Indiana, Minnesota, North Dakota, South Dakota and Illinois voted in favor of the regulation. Missouri voted against it.

THE buildings and grounds committee of the common council has approved the appointment of an airport commission which will study airport facilities. The commission will consist of three aldermen, four citizens at large, a member of the land commission and C. U. Smith, terminal director. The commission will be appointed by Cornelius Corcoran, president of the council.

INCORPORATION papers have been filed by the Kapernick Flying Service of Mayville, Wis. The firm is capitalized at $6,000. The company will train students and distribute airplanes. Albert Kapernick, Albert Volkman and Philip Bachhuber, of Mayville, are the incorporators.

J. WARREN SMITH has been named general manager of the Northern Airways, Inc., and will be in charge of the flying school, sales organization and taxi services of the company. Mr. Smith is a former air mail pilot. The Northern Airways distributes Waco and Stinson planes and recently took over the agency for Aeronca planes.

THE Janesville City Airport Company has been incorporated at Janesville, Wis., and has been authorized to issue 500 shares of stock at no par value. In addition to conducting an airport, the corporation is authorized to deal in aircraft and safety equipment, operate planes, conduct a flying school, build hangars for storage, repair aircraft and hold agencies for the sale of aviation equipment and supplies. The incorporators are Herman E. Krause, Carl E. Krause, Harold Wegner and Harold Crabtree.

AN amendment to the articles of incorporation have been filed with the register of deeds by the air Air City Airways, Inc., of Racine, Wis., changing the name of the company to the Racine Airways, Inc.

MINNESOTA

[L. F. YOUNGSTROM]

NORTHWEST AIRWAYS, INC., inaugurated a new air mail and passenger air service between the Twin Cities and Omaha, May 8. The only stop en route is Sioux City, Ia. Runs will be made every Thursday, according to present plans.

Arrangements have been made with the Boeing Air Transport which operates large passenger planes between Chicago and the Pacific Coast daily to transfer St. Paul-San Francisco passengers at Omaha. The East-West planes meet at Omaha at 1 p. m. and connections can be made easily. This would bring San Francisco to within twenty-four hours of the Twin Cities.

Planes of Northwest Airways connect with the Rapid Air Lines which operate between Omaha and Kansas City where connections are made with the Transcontinental Air Transport.

Northwest Airways, Inc., operates fifteen planes and employs fourteen pilots. The line operates three daily mail services between the Twin Cities and Chicago, two passenger runs every day, a daily run between Green Bay and Milwaukee for passengers, mail and express and a weekly service between the Twin Cities and Winnipeg on Tuesday northbound and Wednesday southbound.

PLANS for inaugurating an air police patrol, the first of its kind in Minnesota, were completed early in May at a conference between Mayor W. S. Randall of Robbinsdale, heading a special committee of the town council, and Gene Shank, operations manager of the Shank Flying Service. The plans, which provide for Mr. Shank and two of his pilots being sworn in as deputies, and contemplate an aerial patrol of approximately fifty square miles, including Robbinsdale, have been presented to the city council for approval.

The planes are to be equipped with radio receiving sets. One pilot will remain on duty at the field at all times, and ships will

have special markings to designate them for their work.

ALTHOUGH the estimated cost of the proposed administration building at the Wold-Chamberlain Field, Minneapolis, is $16,700 above the expenditure authorized by the board of estimate and taxation, members of the improvement committee of the Minneapolis park board have announced a plan to finance early construction.

The committee has voted to recommend acceptance of the lowest bid and to request the board of estimate and taxation to permit diversion of $16,000 from the authorized expenditures for other airport improvements.

The lowest bid for the construction of the building was $52,585, to which sum will be added approximately $4,000 for architect fees, excavation work and other expenses. The board of estimate and taxation recently authorized an expenditure of $40,000 for the building.

TWENTY-FIVE per cent reduction in rates, and a revision of schedules have been inaugurated on the weekly St. Paul-Winnipeg air transport service by Northwest Airways, Inc. The one-way fare is $30, and the round trip is $50.

The service will be operated on Tuesdays and Wednesdays. A plane will leave St. Paul at 8:45 a. m. Tuesday; Minneapolis at 8:55; Fargo at 11:05 and arrive at Winnipeg at 1:05. The return plane will leave Winnipeg at 2 p. m. Wednesday; Fargo at 4:05 p. m.; arrive at Wold-Chamberlain Field at 6:10 p. m. and the St. Paul Airport at 6:20 p. m.

NEBRASKA

THE Lincoln Aircraft Company of Lincoln, Neb., recently delivered a Lincoln plane to each of the following: Julian C. Miller, Jr., of Sandusky, Ohio; Light Manufacturing and Foundry Company, Pottstown, Pennsylvania, and Red Oak Flying Club of Red Oak, Iowa.

[J. R. LOWELL]

A JUNIOR Chamber of Commerce Flying Club has been organized at Lincoln. The club will operate from Arrow Airport at Lincoln and will use Arrow Sport planes. Training will be under the supervision of the regular staff of instructors of the Arrow Flying School. Herbert F. McCulla is president of the organization. There are twenty-five members in the flying club.

JOHN SEAWELL of Yakima, Wash., has obtained the Arrow Sport franchise in western Oregon and northern California, where he will establish a number of Arrow-equipped flying schools this year. Ralph E. Anderson, former instructor in the Air Corps, has joined the staff of the Arrow Aircraft and Motors Corporation as factory sales representative. He was formerly Southern sales manager of the Lincoln Aircraft Company.

JAMES FISHER, manager of the Arrow Airport and Flying School, reports that twenty-three students signed up for the private license course, following the announcement of the Flying Fifty Arrow Club that the cost of the private license course had been reduced to thirteen dollars an hour for dual instruction and ten dollars an hour for solo time, payment to be made by the student on an hourly basis. Thirteen of the twenty-three new students were from the University of Nebraska.

THE Burlington Railroad announces that arrangements have been made whereby passengers may buy tickets through to points east of Chicago, using the Burlington lines to Chicago and the Stout Air Lines on the rest of the trip. Arrangements include the transferring of passengers and baggage to and from the airports in Chicago, Detroit and Cleveland.

PLANS for marking every town in Lancaster County, Neb., for identification from the air, have been adopted by the Lincoln Chapter of the N.A.A. Members of the association will fly over towns in the county to select the best places for marking. The name of each town will be painted on the top of the building best suited for the purpose and the cost of the marking will be paid by local citizens. Jansen is the first of the Lancaster County towns to be marked, the name of the town having been painted in letters six feet high on the roof of the building of the Jansen Lumber Company.

A GOOD will air tour will be sponsored early this summer by the Lincoln Junior Chamber of Commerce. The aviation committee in charge of arrangements for the tour includes Walton Ferris, chairman; William Barkley, Arthur H. Bass, Otto A. Fahrenbruch, F. P. Harris, Earl E. Hagerman, James A. Haveland, Carl I. Junge, Emmett Junge, Harold Marcott, Paul F. Nelson, R. E. Powell, W. B. Roberts, Morris H. Schneider, and Harry Sidles.

THE State Aviation Committee of the American Legion has proposed that the period in which the second All-Nebraska Air Tour, sponsored by the Omaha Chamber of Commerce, is held, should be a State Aviation Week. The program of events would include model plane contests and campaigns to stimulate the marking of towns and the improvement of airports.

TWO automatic telegraph printers have been installed at the Hapgood Airport at York, and will replace long-distance telephone connection at Hapgood Field with the Government Aviation Weather Bureau at Omaha. Weather stations of this type are in operation at Omaha, Lincoln, York, Lexington, North Platte, Big Springs and Sidney. While the Government has contracted for a great deal of equipment at Hapgood Airport, the field will remain under the supervision of the York Commercial Club.

THE City Council of Lincoln has passed an ordinance extending police supervision over the Municipal Airport, seven miles from the city limits. Under the ordinance all of the ordinances now in force in the city, or that hereinafter may be enacted, will have the same reference to the airport as they do to the city proper.

THE Rapid Air Transport Company of Omaha, which recently established a passenger line from Omaha to Kansas City, has inaugurated the use of coupon books entitling owners to passenger or express transportation on lines of the company. The books may be purchased for $55 and $110.

THE Pioneer Aircraft Company of Omaha will distribute gliders made by the Cessna Aircraft Corporation of Wichita, Kansas. Roscoe G. Conklin will be in charge of sales of gliders.

H. M. GREGORY has been appointed dealer for Eaglerock gliders in Nebraska.

TWO weeks' active-duty training for Reserve officers of the Army Air Corps of the Seventh Corps Area, will be be held at Fort Crook July 20 to August 3. More than twenty-five officers will be stationed at Fort Crook for two weeks of flying. Six planes will be brought from Fort Riley, Knasas.

OMAHA

[C. P. RODMAN]

THE Overland Airway Corporation of Omaha has built several light training ships and conducted flight tests during the past six months. The company plans to manufacture these planes commercially. The plane weighs less than 800 pounds, including a capacity load of oil and gas, and will carry passengers and baggage with a total weight of 1,300 pounds. A LeBlond power plant developing from sixty to sixty-five horsepower is used. The plane is designed for training purposes.

PRELIMINARY plans for the development of Bellevue Airport, five miles south of Omaha, have been completed, according to Attorney W. J. Hotz. Maj. Lanphier will be manager. The purchase of the land and improvements will cost approximately $1,000,000. Ben F. Wyatt, representative of the Ford Motor Company, is one of the directors of the company. It is planned to have the port in actual operation not later than September 1. A flying school will be conducted and the buildings of Bellevue College will be used for this purpose. Prominent Omaha business men identified with the project are: C. C. George, Raymond Bauer, Harry Jacobberger, Edward Pettis, John Flynn, J. F. Coad, Joseph Huckins, P. F. Petersen, J. F. McDermott, and J. M. Lynch.

(Continued on next page)

(Nebraska News continued)

LAST September 150 of the merchants and business men of Omaha made a good will air tour through Omaha. This year they plan to make a similar tour, scheduled to take place in June.

THE board of directors of the Rapid Aviation Company elected at the first annual meeting are as follows: Walter F. Halley, Donald M. Halley, Paul Selby, Sam Houser, Arthur Klopp, C. E. Goddard, John McGurk, E. C. Ripley, S. R. Gordon and J. T. Stewart. Walter F. Halley is president of the company.

KANSAS

THE BUCKLEY AIRCRAFT COMPANY started production of an all-metal, low-wing four-place cabin plane recently in a factory nearing completion in Wichita, according to Roy B. Buckley, president of the firm. The announcement was made following a directors' meeting attended by William B. Stout, chairman of the board.

No welding or steel tubing will be used in construction of the Buckley plane, which will utilize a special framework new to the aviation industry, Mr. Buckley said.

THE AUTOMATIC PARACHUTE COMPANY, capitalized at $150,000, has been incorporated under the laws of Kansas in Wichita, Kan. Incorporators are L. E. Simpson, C. H. Bartholomew, Roy A. Sharp, A. Cale Blakely, and George W. Cox.

WICHITA

[E. W. PRYOR]

BROWER AIR SERVICE has extended its Wichita-Omaha line to Blackwell, Okla. Irl Beach is in charge of the southern terminal. The Brower company will take charge of the Blackwell airport, a 155-acre field, and will operate a flying school. The schedule organized by the company is as follows: leave Blackwell at 9:30 a.m.; arrive Wichita 10:20 a.m.; from Omaha, arrive Wichita 3:20 p.m.; and arrive Blackwell 4:20 p.m. The general offices of the Brower company are at Salina, Kan.

UNITED STATES AIRWAYS during April extended its line from Oklahoma City to Salina. Officers include W. A. Letson, president; Fred D. Martin, director; and George Halsey, operations superintendent. Planes from Wichita to Salina connect with the main line of the United States Airways from Kansas City to Denver. On the southbound route, one plane goes to Tulsa and one to Oklahoma City. Enid, Okla., is a regular stop, and Ponca City a flag stop.

FRANK SMITH has been appointed general manager of the Buckley Aircraft Company of Wichita. Work on the first unit of the factory which the company is building has been completed, and machinery and material have been installed. The Buckley company will build all-metal cabin monoplanes.

BRALEY GLIDER CORPORATION has secured a State charter to manufacture powered gliders. Officers of the company are: Thomas E. Braley, president; Opie Swope, vice president; C. A. McCorkle, secretary; L. R. Parkerson, treasurer, and S. W. Braley, C. C. Caswell and R. L. Weyher, directors.

The Braley glider has a covered fuselage and an airwheel landing gear. The ship is of the secondary type and is designed for training and advanced flying. A two-cylinder engine of approximately eighteen horsepower will be installed in the glider. The company is sponsoring glider clubs, and has awarded ten scholarships in its gliding school to boys selected by the Kiwanis club.

AIRCRAFT SERVICE, INC., has been formed and will erect a service station at the Wichita Municipal Airport. The shop will contain facilities for servicing and repairing Wright and Kinner engines. J. C. Riggs, E. W. Kolthoff, J. H. Heckman, Merle E. Johnson and Hervey E. Teitzel are incorporators.

OKLAHOMA

CHARLES R. RUSSELL, airport engineer, has opened offices in the Hightower Building, Oklahoma City, Oklahoma. Mr. Russell was formerly in charge of airport construction for the Curtiss-Wright Flying Service.

DEDICATORY ceremonies of the Municipal Airport at Muskogee, Okla., developed at a cost of $200,000, were held May 26. Secretary of War Patrick J. Hurley presided at the dedication. The ceremonies included aerial exhibitions in which planes of the Army Air Corps, Naval Air Service, and commercial planes participated and contests in which prizes were awarded the winners of the various events.

The airport was formerly known as Hatbox Field and was established in 1922 largely through local funds. The field contains adequate lighting facilities and runways are over 3,000 feet in length, extending in all directions. Two hangars have been constructed and the Government has established a meteorological station.

The commanding officer of the Army Air Corps forces stationed at the field, is director of the Municipal Airport. At the present time no landing fees are charged and free transportation from the airport to Muskogee is provided by the city.

[C. M. COLE]

A BIPLANE designed by W. S. Collier of the H. F. Wilson Aeronautics, Inc., of Tulsa, will be manufactured by the Wilson company. The plane has a cruising speed of about 100 miles an hour, a landing speed of thirty-five miles per hour and a high speed of 115 miles per hour, and is powered with a 110-horsepower Warner Scarab engine. The overall length is twenty-one feet and the wing span is thirty-one feet. Dual controls and a set of Navy type instruments are provided. The plane is designed as a training ship. The plane will be produced with any type power plant desired within the 100 to 150 horsepower range.

AN "AIR-PORT FROLIC" was given recently by the University Club at the Curtiss-Wright Flying Feld. The airport was placed at the disposal of the club members. The floor of the new Curtiss-Wright hangar was used for dancing. The management of the field, under the direction of E. B. Graham, staged a flying exhibition, and inaugurated a temporary night service, offering rides to the guests.

IOWA

[R. W. MOORHEAD]

A FIFTY year lease of the Iowa City Airport, offered the Boeing Transport Company, has been approved by the city council. The lease stipulates that the company may at the end of any five year period turn the field back to the city; or may relinquish the field at any time within the first five years by paying a rental of $3,000 a year. Under the terms of the lease the Boeing Company will be allowed to assess fees on private flyers using the field. The lease requires that the field be improved to A-1 rating, part of the cost being defrayed by the city, a project which may cost $50,000 with $12,000 furnished by the city. The contract may be terminated at the end of any ten years at the option of the city and by the Boeing company in the event of the company losing its Government air mail contract.

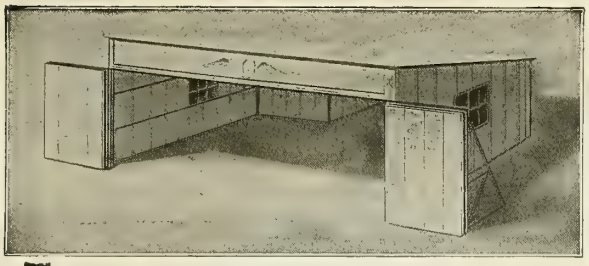
COMMITTEES which will be in charge of the third all-Iowa good will air tour, June 16-22, have been announced by George Yates, chairman of the committee in charge of the tour. Jack Walton and Charles Gatschet will have charge of invitations; John Shuler will handle finances and arrange for entertainments; and John Ball is chairman of the publicity committee. Arrangements have been completed for glider exhibitions to be held in conjunction with the tour.

ILLINOIS

THE Chicago branch sales office and warehouse of the Bunting Brass & Bronze Company of Toledo, Ohio, has been moved to 1221 West Washington Boulevard, Chicago. The offices were formerly located on South Michigan Avenue. The acquisition of larger quarters is included in a program of expansion which the company has started.

THE name of the Stromberg Motor Devices Company of Chicago, Ill., has been changed to the Bendix Stromberg Carburetor Company. The company has moved its plant from Chicago to South Bend, Ind., where an office and factory building, equipped with modern facilities for increased production, has been constructed. The company is a division of the Bendix Aviation Corporation.

(Continued on next page)



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Individual Hangars
For Private Planes

Edwards Individual Hangars are built throughout of steel and shipped complete, ready for immediate erection.

Simple in design and rigid in construction, these hangars provide positive, permanent protection from fire, lightning, wind and weather and from carelessness of unauthorized use in public hangars.

We also make a complete line of garages, oil and filling stations, warehouses, large hangars, etc.

Write for prices.

THE EDWARDS MANUFACTURING CO.
345-395 Eggleston Avenue, Cincinnati, Ohio



UP....AND OUT
of any kind of field
WITH THE NEW HEATH PARASOL

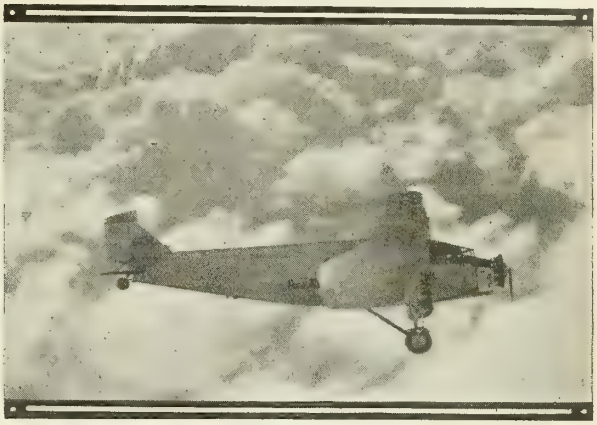
DESIGNED to get out of the high grass and weeds any place.

America's Most Popular Sport Plane, although finer and faster, is still available at $975 or build it yourself for $199.

Send 10c. in coin or stamps for large illustrated booklet.

HEATH AIRCRAFT CORP.
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AIR TRANSPORTATION MADE SAFER
With the RACON AIRPLANE SPEAKER





THE use of radio in aircraft operation is made doubly valuable with the new Racon amplifier. Air transport companies will find it of inestimable value in the safe delivery of passenger and express cargoes during bad weather. During recent tests in Chicago, in a snow storm, the voice was distinctly audible more than a mile away. No pilot or operator can fail to realize the import of establishing communication between the plane and the ground crew preparatory to landing when visibility is so poor that a safe 'set-down' is nothing more than a matter of a good guess and plenty of luck.

FOR AERIAL ADVERTISING

Through the Racon Airplane Speaker the broadcaster's voice can be heard for miles. Even though the plane may be hidden in the clouds, the voice—or music—can be heard above the din of city traffic. During the Chicago tests music was broadcast from a phonograph record and was heard very clearly several miles away.



LIST PRICE $35

Baby Electro Dynamic Horn unit capable of handling undistorted output of 15 watts.

The Racon Airplane Speaker was designed for airplane or airport use. It is very light and compact and was built to withstand rapid changes in air pressure. Instead of the usual dynamic unit, the Racon horn is equipped with four apertures utilizing four Racon Giant dynamic units. Consequently the Racon horn has four times the ordinary volume.



Giant Electro Dynamic Horn unit capable of handling undistorted output of 30 watts.

Units will operate under all variations of air pressures occurring during flight.

Write for complete description and price

RACON ELECTRIC COMPANY, INC.
18 Washington Place
New York City

3 Mutual Street, Toronto, Canada
Slough Bucks, England

(Illinois News continued)

THE Boeing System has installed a radio ground station at Aurora, Ill., thirty miles west of Chicago, as the eastern terminus of its chain of fourteen ground stations between San Francisco and Chicago. A direct wire connects the Aurora station with the Chicago Municipal Airport.

PRODUCTION of an air-speed indicator has been started by the Aircraft Instrument Division of the Elgin National Watch Company of Chicago, Ill. The instrument is fully jeweled, having five sapphire and ruby jewels, designed to reduce frictional and vibrational error to a minimum.

[J. L. LUCAS]

THE Ottawa Gliding Club has purchased a Cessna glider. Members of the club will receive primary instructions from Fred Machesney, owner and operator of the Rockford Airport, Rockford, Ill. Dr. Roswell Pettit is president of the club, and Sherman R. Lewis is treasurer.

MISSOURI

ONE year of operation of the air mail route between St. Louis, Kansas City and Omaha was completed on May 1. The line was opened May 1, 1929, by the Universal Division of American Airways, Inc., operating on a daily schedule. Night operations on this route were started on October 1, St. Joseph, Missouri, being a stop, and over-night mail service to the Southwest via connections in Kansas City was started.

The annual operations report of this route was recently issued by Halsey Dunwoody, executive vice president of the Universal company. A total of 115,963 pounds of mail were carried, and planes flew a total of 425,384 miles in 4,516 hours of flying. These figures include both the day and night runs. Of the total poundage, 71,925 pounds were carried during the year on the day mail run. Of the total number of miles flown, 277,173 were flown on the day run.

During first year, 1,154 trips were scheduled, 1,095 were started and 1,022 were completed. Ninety-two per cent of the cancellations were caused by adverse weather conditions, chiefly fog. These latter figures include both the day and night runs.

The day run had 730 trips scheduled, of which 711 trips were started and 663 trips were completed. Of the 48 uncompleted trips, 15 were due to late arrival of planes from the West Coast for connection with Universal's planes at Omaha. Flying over C.A.M. 28 was possible only to dusk, as the airway was yet unlighted.

THOMAS. A. BATSON has been appointed employment director of the Universal Aviation Schools. He succeeds Glen Ogle.

Mr. Batson will maintain headquarters in St. Louis and will supervise representatives in each city where a Universal School is located.

[M. SHEETZ]

CONSOLIDATED Air College of Kansas City has opened a branch school at Trenton, Mo. Norman K. Warner is chief instructor. Under a plan adopted by the company, tuition money is deposited in a Trenton bank and not turned over to the company until a student has completed his course.

JEFFERSON CITY and Columbia will have a direct air route to Kansas City with the inauguration of a short air line between these cities in the near future by Blaine Tuxhorn, operator of the Tuxhorn School of Flying, Kansas City. A daily schedule will be maintained and Bellancas will be used. Mr. Tuxhorn will erect a building for hangar and offices at the Kansas City Airport.

A GLIDER club has been formed at Columbia by fifteen business men. A Waco glider has been purchased and will be kept at the Allton Airport where it will be flown by members. R. F. Montgomery, manager of the airport, will be in charge of instruction.

BARGAIN rates in the form of "penny a pound" charges for passenger hops have created a rush of business for the Allton Flying Service at Columbia. In one day two ships carried a total of 14,000 pounds.

CONSTRUCTION has started on the airways range station at Columbia, one of three in the State of Missouri. The structure will be one story, eighteen by twenty-one feet. The Department of Commerce has installed teletype machines, wind indicators and velocity gauges on the Allton Airport.

REPRESENTATIVES of the Mississippi Valley Airways, Inc., of Cape Girardeau, Mo., have signed a contract giving them possession of the stock and equipment of the Boyer Aircraft Corporation of Sikeston, Missouri. According to Dr. George Huff of Cape Girardeau, and F. S. Moore of Chaffee, Missouri, it is the plan of the company to expand the Sikeston facilities of the company and to begin training flying students. The company plans to install lighting equipment. A ground school has been conducted for some time in Cape Girardeau and active flying will be offered in the near future.

ST. LOUIS

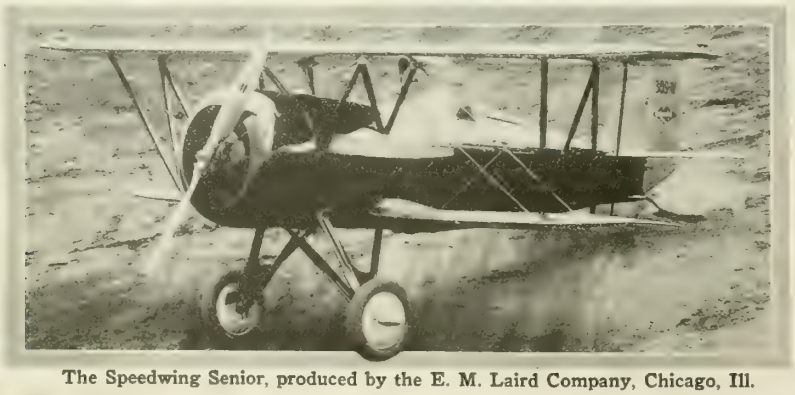
[A. W. LEAGUE]

THE Union Electric Light and Power Company of St. Louis has purchased a trimotor Ford transport which will be used for surveying and patroling transmission lines between Keokuk, Iowa, and St. Louis and River Mines, Missouri, and to survey more than 500 miles of proposed lines leading from the new hydro-electric development of the company on the Osage River.

TRANSFER of T. A. T.-Maddux activities from the St. Louis Municipal Airport to the new Curtiss-Steinberg Airport will take place shortly. T. A. T. has operated the Municipal Airport since the coast-to-coast service was started last July.

WITH the grading and filling practically completed at the St. Louis Municipal Airport, there are now available approximately 360 acres of level landing area. Cold Water Creek, which formerly bisected the landing area, is in a new channel and the former creek bed has been filled and leveled. About three months will be required to finish the work of grading and laying 22,500 square yards of concrete for the new concrete drives, walks and parking area on the west side of the airport. Plans call for a concrete drive sixty feet wide and concrete roadways and walks extending for about 2,000 feet immediately to the rear of the hangars on the west side of the field. Two recommendations for improving the night lighting facilities at the airport, either of which would double the strength of the present facilities, have been presented to the airport commission by its engineers. Both systems would double the requirements of the Department of Commerce. One of the systems could be installed for $30,000 and the other for $32,000. A lighted wind T has been erected at the airport.

THE weather station at the St. Louis Municipal Airport has been equipped to send and receive weather information over a distance of approximately 1,000 miles, including Kansas City, Omaha, Chicago and intermediate points. The service replaces the previous system of sending weather reports by radio. The system is operated wtih



The Speedwing Senior, produced by the E. M. Laird Company, Chicago, Ill.

automatic printers over American Telegraph and Telephone Company wires, each station on the circuit being in constant touch with the others. Hourly reports are placed on the wires by thirty observers and one observer may request and receive information from another in less than two minutes.

KANSAS CITY

[H. H. JAMES]

D. H. HOLLOWELL, formerly sales manager and a vice president of the American Eagle Aircraft Corporation, has affiliated the Woods Brothers Corporation, owners of the Fairfax Airport. Maj. J. Carroll Cone will succeed Mr. Hollowell as a member of the American Eagle organization.

TWO new types of biplanes have been developed by American Eagle Aircraft Corporation. The planes will be powered with Brownback and American Cirrus engines.

FOUR new dealers have been appointed by the American Eagle Aircraft Corporation. They are as follows: National Airways, Inc., Detroit, Mich.; Intercity Flying Service, Inc., North Kingsville, Ohio; Allen Flying Service, Hobart, Okla., and Rockne Bros., Angola, N. Y.

DURING the week ending April 19, 1,025 passengers arrived and departed at the Kansas City Municipal Airport, according to an announcement of Roy C. Farrell, manager. Of this number, 692 were traveling on airlines operating on a regular schedule out of the airport.

KENTUCKY

[A. W. WILLIAMS]

LOUISVILLE'S annual air show was held on May 16-17 in conjunction with the Kentucky Derby on May 17. Planes were used by many spectators coming to the Derby. Many arrived on Saturday and left the same day, escaping much crowding and jamming and hotel bills. The distance from Bowman Field to the Downs where the Derby was held is about ten miles.

Bowman Field has been improved during the past year and the Louisville and Jefferson County Airboard has secured a field adjacent to Bowman Field for the use of students. Housing facilities for visiting planes in any such numbers as came for the Derby were not available. The only hangars are those of the Curtiss-Wright Flying Service, and the Army Air Corps, the latter having surplus space which is utilized by planes operated at the airport.

A FEDERAL air board has been named at Louisville, and will examine pilots for Reserve officers ratings, under orders received from Fort Hayes, Columbus, Ohio, Fifth Corps Area Headquarters, War Department. Members of the Examining Board are Capts., F. E. Galloway, commanding officer, Bowman Field, chairman; Justice K. Hetsch, Sidney W. Park, Alin L. Pritchard, L. S. Vance, and George D. Converse; First Lieuts., Duncan McCallum, and Albert Woody; and Second Lieuts., John Russ and Roy L. Mitchell. The name of the 465th Pursuit Squadron, Louisville, has been changed to the 325th Obeservation Squadron.

THE American Business Men's Club, Louisville, recently repainted an arrow 500 feet long and 100 feet wide, directing air traffic to Bowman Field, and located on top of the Louisville Public Warehouse Building, at Seventh and Magnolia Avenue.

GREENVILLE, KY., is reported to be developing a flying field, and recently completed seeding and fertilizing the soil of the field. The Bell Fiscal Court, Middlesboro, Ky., recently made an appropriation for an airport at Middlesboro, Ky. Part of the cost will be paid by the city. Army officers have completed a survey for an airport at Glasgow, Ky., where a 101-acre tract will be developed.

TENNESSEE

A. D. NIEMEYER, director of Memphis-Universal Aviation School, was host recently to winners of the monthly model airplane contest, sponsored by the Memphis Model Aero Club. Roy Martin and Harold Magee were among the winners of the events and were given rides by Director Niemeyer.

FLIGHT students at the Memphis-Universal Flying School have organized a glider club, and will build a glider in the Universal ground school classroom.

H. CUTLER, of Dallas, Texas, has been appointed sales manager for the Memphis-Universal Aviation School. He was formerly assistant sales manager of the Kansas City-Universal Aviation School. Mr. Cutler will be assisted by Frank Schulz, Jr., formerly of the traffic department of the Universal system at Kansas City.

VIRGINIA

[C. N. SNEAD]

ONE hundred and thirty-four planes comprising the aircraft squadrons of the battle fleet attached to the carriers *Saratoga, Lexington* and *Langley,* have returned to the Hampton Roads Naval Air Station from a flight to New York and New England. More than 1,200 miles were covered without accident.

THE Roanoke Municipal Airport now nearing completion, has been leased by the Reynolds Flying Service. Plans are being made for a public dedication of the field.

MISSISSIPPI

[O. G. JONES]

A BILL providing for the establishment of a division of aeronautics in the highway department of the State of Mississippi has been drawn up by seven members of the House of Representatives of that State. Under the provisions of the bill the head of the highway department would serve as director of the aeronautics division with the authority to appoint eight additional members under him. They would serve without pay.

LOUISIANA

ARTHUR E. CAMBAS, of New Orleans, Louisiana, was the only bidder for carrying the mails by air from New Orleans to Pilottown, Louisiana, when bids were opened in the office of Assistant Postmaster General Glover on April 25. Mr. Cambas, the present contractor for this route, submitted a bid of $100 for the round trip. The contract runs for one year. This service carries the mail from steamers bound for the port of New Orleans and deposits it in the postoffice there before the arrival of the steamers. Outgoing mail is picked up at the New Orleans office and placed aboard steamers passing Pilottown for foreign ports, and which have already left New Orleans.

[C. F. COCK]

THE Wedell-Williams Air Service, Inc., which is operating a passenger service between Shreveport and New Orleans, will begin operation of a service from New Orleans to Fort Worth, Texas, according to a recent announcement. It is planned to establish the line about June 1, and a two-way schedule will be provided. The service will be through Shreveport. It is contemplated by officials of the organization to include Baton Rouge and Alexandria on the line during the summer. Wedell-Williams recently purchased two eight-place Lockheed-Vegas, each having a cruising speed of 150 miles per hour.

CONSTRUCTION of a hangar 100 by 150 feet and costing $35,000 at the Parish Airport in Baton Rouge is contemplated by the Standard Oil Company of Louisiana, according to a recent announcement. Arrangements have been made by the company with the East Baton Rouge Parish Police Jury for a twenty-year lease for the gasoline and filling station privileges at the airport.

THE Airport Commission and East Baton Rouge Parish have been instructed by the Parish Police Jury to call for bids on the hangar, field lighting and administration building at the Parish airport.

FLORIDA

BECKWITH HAVENS and Mrs. Angela Cobb Sessions, daughter of Mr. and Mrs. Hubbell Cobb, of Rochester, N. Y., were married in Miami recently. Glenn H. Curtiss gave the bride in marriage.

Mr. Havens, who was closely identified with early aviation history, recently completed a ten-week aerial trip through Central and South American countries. He made the voyage by Pan American Airways.

(*Florida News continued*)

THE Eastern Air Transport has reorganized its northbound schedule and started night flying from Miami and other Florida cities recently! The northbound plane now leaves Miami at 5:30 p. m. and another leaves St. Petersburg at 5 p. m., connecting with the Miami plane at Daytona Beach after stopping at Tampa and Orlando. Planes leave Daytona Beach at 8 p. m. for Jacksonville and Atlanta. Jacksonville is reached at 9:05 p. m. and Atlanta at midnight. At Atlanta the mail is distributed to planes flying the New York and Chicago routes.

TWO suits have been filed against the City of Tampa for damages for loss of airplanes and equipment when fire swept the municipal hangar on December 12 and destroyed equipment stored in the building. The suits have been filed in behalf of the McMullen Aviation Company and the Airways Transport, Inc.

ALABAMA

[O. G. JONES]

THE Thirty-first division, Alabama National Guard, recently staged a two-day air show at Roberts Field, Birmingham, the program consisting of stunts, races and other exhibitions.

THE Hutchison Flying School recently organized at Mobile has completed the construction of a building at Bates Field which will serve as headquarters for the company.

LEGION Field, the airport at Selma, formerly operated by the Government, has been taken over by the city and will in the future be operated as a municipal field. Several improvements, including the lighting of the field, are contemplated.

WORK on grading the 300-acre site for Birmingham's new municipal airport will start in the near future. The contract was let recently to Millsap and Parker and the Nichols Construction Company. Grading is scheduled to be completed by October 1. The bid was for $110,750.

TEXAS

[C. MORRIS]

THE annual Fort Worth good will tour will be held in the Fall, in accordance with the recommendation of a special committee of the Chamber of Commerce headed by Hubb Diggs, chairman.

IN ACCORDANCE with the plans of the Government to establish a lighted airway between Fort Worth and El Paso, ten tracts of land to be used as emergency landing fields on the route have been purchased. Contracts for lighting and other equipment will be let soon. The airway is expected to be in operation by next November.

AN AERIAL survey of the lower portion of the Mississippi River and of the Red River, a part of the preliminary work of the War Department to curb flood danger in the South, has been announced by John D. Miller, who is in charge of photographic operations. The total survey of the rivers will cost $50,000 and will include 5,000 photographs covering an area of 8,000 square miles.

THE Gulf Aero Corporation has been incorporated at San Antonio, Texas. The company will engage in airplane manufacture. The incorporators are M. P. Dunne, Court Dunkerly, and Thomas P. Brett.

RADIO receiving sets have been installed on the trimotor planes operating on the Southern Air Transport Dallas-Fort Worth-Tulsa branch of the Dallas-Cleveland line.

CURTISS-WRIGHT FLYING SERVICE, which is operating an insect control bureau at Houston, Texas, now has five planes in California engaged in dusting grapes and citrus fruits. Other operations to be engaged in soon include the dusting of several thousand acres of potatoes in Southwest Texas and the dusting of citrus fruit in Florida. Cotton dusting operations were to begin about June 1. Sixteen ships are in storage in Houston awaiting the coming of the cotton season. Eddie Bond is in charge of the dusting operations.

PLANS are being completed for the construction of a new three-unit structure at the Fort Worth Municipal Airport, Fort Worth, Texas, containing offices, passenger station, service station, weather bureau and dispatcher's office. The building will have three stories and will be 130 feet by 245 feet. Plans are being drawn by W. G. Clarkson. William G. Fuller is field manager.

THE Curtiss-Wright base at Dalworth, Texas, was recently opened. The base is valued at $750,000. The field is 4,801 feet by 2,786 feet, naturally drained, sodded in Bermuda grass, and situated in open country. Hangar, offices, ships, ground school, and facilities for passengers and pilots are contained in a brick building 120 feet by 100 feet. The hangar has 10,000 square feet of floor space. A taxi service is maintained at the airport. Officials at the field are W. A. "Tex" Bohannon, manager; Samuel D. Irwin, assistant manager; E. G. Gregory, ground school instructor.

MEXICAN AERONAUTIC TRANSPORTATION CORPORATION, with offices in Brownsville, announces that approximately 800,000 pesos ($400,000) will be spent on new equipment, including twenty-one planes, landing field and hangars. The company operates air transport services from

(*Continued on page* 166)

NEW PUBLICATIONS

Brief Reviews of Texts, Handbooks and Novels of Aeronautical Interest

The Steel Construction of Aeroplanes

By HARRY HARPER

THE history of the use of metal in aircraft and aircraft engines, and a discussion of the present day methods of employing metal for this purpose are contained in "The Steel Construction of Aeroplanes," by Harry Harper. This book discusses the problems of the pioneers in the application of metal construction to aircraft and describes the development of metal for aircraft. Included in the table of contents are: "The Advent of Stem Power"; "Problem of Control"; "Tubes and Spars of Steel"; "Fundamental Principles"; "Question of Corrosion"; and "Repairing Steel Aeroplanes." The text is illustrated with drawings by Geoffrey Watson.

Engineering Materials, Vol. I—Ferrous

By ARTHUR W. JUDGE

INTENDED for the engineer and designer rather than the metallurgist, "Engineering Materials, Vol. I—Ferrous," by Arthur W. Judge, is a revision of "Aircraft and Automobile Materials" published by the author of 1920, and includes additional discussions of several branches of the subject mentioned in the previous volume. In addition, the revised edition includes new matter relating to developments in metallurgy during the past ten years. The book makes available in a single volume the more important information on the application of engineering materials for the benefit of engineers and designers. Considerable attention is devoted to cast iron and alloy steels, stainless steel and irons, pyrometry, heat-treatment and furnaces.

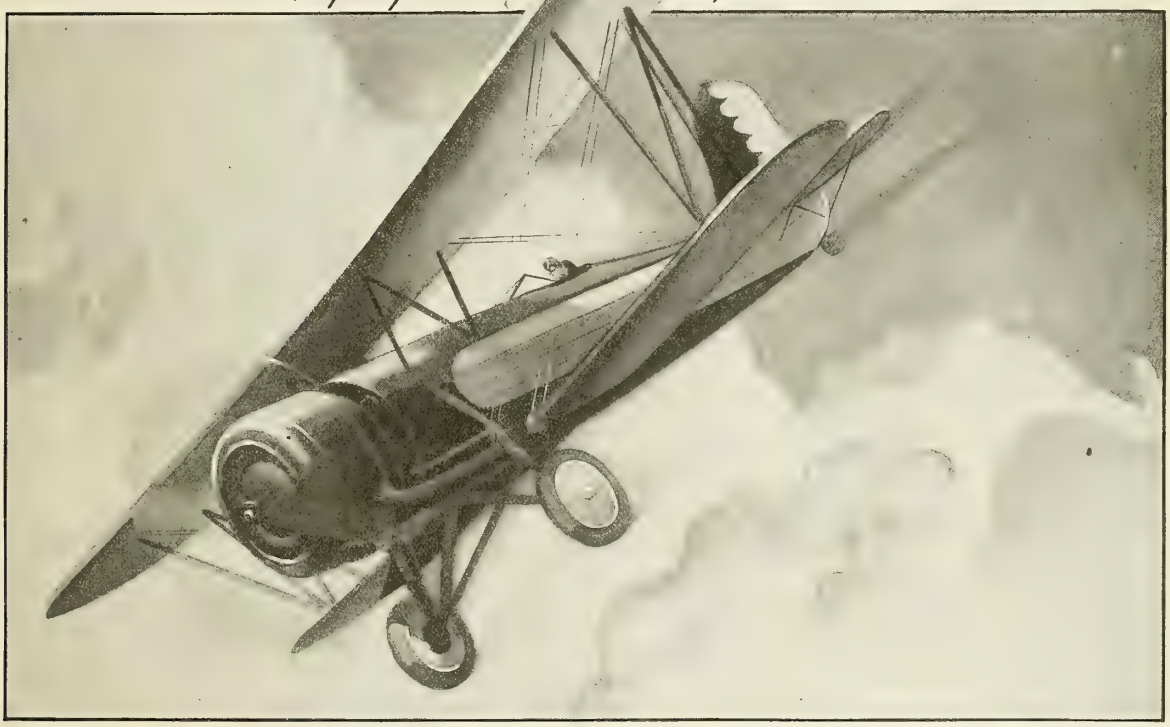
Aviation's Place in Tomorrow's Business

By EARL REEVES

WRITTEN for readers with a professional or a personal interest in the present day developments and the future of aviation, "Aviation's Place in Tomorrow's Business," by Earl Reeves, is a non-technical volume which discusses the various phases of activity in the aeronautical industry. Included in the contents are discussions of the development of the air mail; present day air transport services; financial trends in aviation; trends in aircraft design; aircraft manufacturing; sales organizations; aviation insurance; and positions in aviation. The appendix contains a trade directory of companies engaged in aeronautical activities including aircraft manufacturers, airport designers and engineers, aircraft operators, flying schools, aviation insurance companies, manufacturers of lighting equipment, and aeronautical organizations; and data on airports, mileage of airlines, air mail operations, aircraft production, accidents, and aviation in foreign countries.

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Jan. 98	17	9,480	11.6	1.06	.120
Feb. 137	38	13,385	12.2	.92	.125
Mar. 192	02	18,362	12.0	.92	.126
Apr. 102	05	9,936	11.2	1.28	.115
530	02	51,163	11.9	1.01	.123

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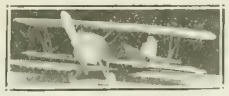
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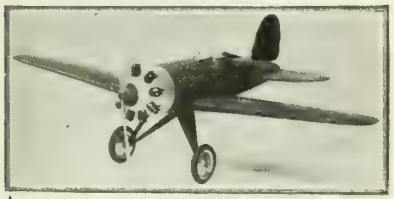
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(Texas News continued)

Mexico City to Ciudad Juarez, and from Brownsville to Mazatlan.

B. B. DILWORTH, Austin, has been appointed Southern Air Transport representative at Robert Bueller Airport, the Austin Municipal airport.

[R. Thompson]

FORMAL dedication of the Curtiss-Wright Airport located halfway between Dallas and Fort Worth was held recently and was attended by about 25,000 people. Over one hundred and twenty-five Army Air Corps and commercial airplanes took part in the races and other events included in the program.

The Curtiss-Wright Airport represents an expenditure of $250,000 for the 300-acre site and $100,000 for the combination administration building and hangar which is 140 by 100 feet. Building material used in the hangar consists of concrete and brick. Stone and Webster of Fort Worth were the contractors in charge of the construction.

W. A. (Tex) Bohannan is manager of the Dallas base and Samuel D. Irwin is assistant manager.

A waiting room twenty feet by forty feet has been constructed in the Curtiss-Wright offices. A ground school classroom twenty feet by sixty feet, fully equipped, is maintained on the second floor of the administration building. H. O. Gregory is instructor of the ground school. The machine shop is twenty feet by sixty feet. Repairs of all descriptions are taken care of in the shop. L. H. Lucky is in charge of operations and the mechanical division. Don Diegel is chief flight instructor.

A stockroom twenty feet by forty feet is maintained on the first floor of the administration building under the supervision of E. G. Hotchkiss, where spare parts, flying clothes and goggles may be purchased.

PREPARED RUNWAYS

(Continued from page 100)

and mechanical angles to determine the proper method of mixing and blending the various asphalts and oils to arrive at the proper consistency necessary for a resilient non-skid surface. First, the base must be properly prepared by means of a hard oil or asphaltic concrete and, in some cases, crushed rock or porous gravel to permit drainage. Water tables over the entire area must be lowered and maintained at the proper depth. This may sound difficult, but to the competent airport engineer it is simple and inexpensive. After the sub-base has been properly prepared, the surface, which may vary in thickness from three to six and possibly eight inches, determined by the geographic location, type and amount of traffic using the runways, is then applied. This top surface has an elasticity that permits the indentation of the wheels and tail skid or tail wheel, upon landing, to a degree that will prevent side slipping and eliminate ground looping to a fair degree. Also, it provides sufficient traction for a quick stopping of the plane and permits of quick take-offs. Because of the semi-porosity of this surface, if it is constructed with the proper curvature of the prepared sub-base, the surface rain water quickly drains off.

In freezing and very severe weather conditions where there is an upheaval of the earth due to frost, the runway moves with the earth and is quickly rolled back into place without any serious damage to the surface. The even texture and color of this surface, contrasted against the surrounding portions of the field, make the runways readily discernible from high altitudes and great distances. By bordering these runways with crushed lime stone or marble dust, or crushed rock whitewashed or painted chrome yellow, floodlighting of these areas becomes very effective. The soft, even texture eliminates glare, the white or yellow borders clearly and distinctly marking the edge of runways, giving the pilot a good perspective for landing. These runways can be designed to support any type of load that may be placed upon them at high or low speeds. The runways above described are on the United Airport No. 1 at Burbank, California.

The airport is the link between air and land transportation. It is there, even more than in the air at the present time, that the success of aviation will be determined. The future city without a properly designed and constructed airport, will be in the same position as the costal city without a well equipped harbor.

GLIDERS

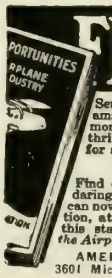
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THE Chamberlin Technical Bureau with headquarters in the Chrysler Building, New York City, has been formed for the purpose of supplying information on aviation without cost. Clarence D. Chamberlin has been named chairman of the bureau and Miss Ruth Nichols has been appointed executive secretary. The organization consists of a committee representing every branch of aeronautics and will disseminate information on aircraft, flight instruments, aviation law, aerial navigation, radio, meteorology, airports, aircraft engines and gliders.

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Describes and shows principal types; gives valuable advice to users; tells how to repack. A necessity to all flyers. $2.25

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Above motors have had from 500 to 900 hours; have been overhauled every 175 hours; are now thoroughly reconditioned and worn parts replaced. Price includes Generator, Control box, C Valves, and starter, no hub.

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(*Continued from page* 147)

and Its Fuel and Oil Problems," by S. D. Heron; "Importance of Oilness in Aircraft Lubrication," by B. E. Sibley; "Present Status of Superchargers for Aircraft Engines," by Dr. S. A. Moss.

A session devoted to aerodynamics was held in the Materiel Building at Wright Field, at which papers discussed were as follows: "Practical Airplane Performance Calculations," by Dr. Michael Watter; "Control at Low Speeds," by Lieut. Carl B. Harper of the Naval Air Service; "The Airscrew With Minimum Loss of Energy," by Prof. Enrico Pistolesi; and "The Application of the Layer Theory of Engineering and Aeronautics," by Peter Thurston. A special meeting at the Engineers Club was held in the evening.

At a general session at the Hotel Biltmore on May 21, those attending discussed a paper entitled, "Silencing the Airplane," by Hugh L. Dryden; and "The General Problem of Fire Hazard in Aircraft," by Lieut.-Comdr. C. G. McCord of the U. S. Naval Aircraft Factory.

"Characteristics of Light Alloys for Aeronautics," by Dr. H. W. Gillett; and "Aluminum Alloys for Pistons and Air-Cooled Cylinder Heads for Aircraft," by Lieut. A. J. Lyon of the Army Air Corps, comprised the papers presented at the materiels session held in the field auditorium at Wright Field in the afternoon. A dinner was given by the A.S.M.E. at the Hotel Biltmore in the evening.

On May 22 a session devoted to the discussion of air transportation was held at the Hotel Biltmore. The following papers were read: "Progress in Altitude Instruments for Blind Flying," by Elmer C. Sperry, Jr.; "The Economics of Airplane Transportation," by Capt. Erich Offermann; and "Principles and Developments of Air Law," by Prof. A. Henry-Courannier.

A session held in the afternoon in the auditorium at Wright Field was devoted to a discussion of aircraft engines, the following papers being read: "Trend in Aircraft Engine Development," by Harold Caminez; "Vibration Characteristics of Aircraft Engine Crankshafts," by F. L. Prescott; and "Installation of Air-Cooled Radial Engines," by P. B. Taylor.

The paper on "Practical Airplane Performance Calculations," by Dr. Michael Watter, states that a design must meet the characteristics set forth in the specification if it is to warrant construction; and that performance characteristics represent a most important requirement. It reaches the conclusion that simplicity must be obtained, even at the cost of scientific accuracy, so long as the calculations give the correct answer. The method described is based on the evaluation of parasite resistance, wing or cell characteristics, and knowledge of engine-propeller behavior.

"The General Problems of Fire Hazard in Aircraft," by Lieut.-Comdr. C. G. McCord, gives a few general principles and points out the trend of investigations that have been made along the lines of fire prevention and fire extinguishers. Discussions of present day aircraft engines and the influence of airplane characteristics on the choice of engine types are contained in "Trend in Aircraft Engine Development," by Harold Caminez. The advantages and problems connected with both air-cooled and liquid-cooled engines are reviewed and possible improvements in each type are outlined.

VILLANOVA COLLEGE will present the 1930 Mendel Medal, awarded annually for distinguished service in the advancement of science, to Albert Francis Zahm, chief of the Division of Aeronautics in the Library of Congress, Washington, D. C., according to a recent announcement of the Rev. Joseph M. Dougherty, dean of the Villanova School of Science. Dr. Zahm made the first wind tunnel with precise measuring apparatus and invented three-torque control for airplanes; an airplane speed meter and shock recorder. He is the author of books on aerial navigation, aerodynamics and airplane stress analysis.

THE Fairchild Airplane Manufacturing Corporation has reduced the price of the Model KR-21 Trainer from $4,685 to $4,125, according to a recent announcement of officials of the company.

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FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

FRANCE

MLLE. LENA BERNSTEIN established a new woman's non-refueling world endurance record of thirty-five hours, forty-six minutes and fifty-five seconds on May 2 in a flight at Le Bourget Field, Paris, France. Mlle. Bernstein took off at 7.18 a.m., May 1 and landed at 7.04 p.m. the following day when the fuel supply was consumed.

The former woman's world endurance record of twenty-six hours, forty-six minutes and thirty seconds was established in July 1929, by Mlle. Maryse Bastie. The American woman's endurance record of twenty-six hours, twenty-one minutes and thirty-two seconds was established last year by Miss Elinor Smith.

In July, 1929, Mlle. Bernstein completed a non-stop flight of 1,562 miles from Marseilles, France, to Sidi Barrani, Egypt.

ENGLAND

THE British Gliding Association has been offered a prize of $5,000 by Cellon, Ltd., manufacturers of airplane dope preparations, to be awarded to the first pilot to cross the English Channel in a glider, according to a recent announcement of L. Ward-Flanders, secretary of the association. The rules governing contestants stipulate that every glider competing for the prize must be launched into the air by manual power.

A RECORD flight of twenty-one days total elapsed time from England to Cape Town, South Africa, and return, a distance of 18,000 miles, was completed on April 30 by the Duchess of Bedford, Capt. C. D. Barnard, pilot, and Robert Little, co-pilot, in the Fokker monoplane, *Spider*. The flight required 200 hours of actual flying time to complete. The record of 175 hours actual flying time from England to Capetown and return was established by Sir Alan Cobham.

On the return trip to Capetown the plane was forced down at Sofia, Bulgaria, as the result of a broken fuel line. Following repairs the flight of 1,350 miles from Sofia to the Croydon Airdrome was completed in twelve hours.

CONSTRUCTION has been started in England on an all-metal amphibion powered with three Bristol Jupiter geared engines having a total of 1,575 horsepower. The ship is of the monoplane type and will accommodate seventeen passengers.

The span is 107 feet and the distance between the floats is twenty feet. The weight of the plane fully loaded is 20,685 pounds, of which 7,984 pounds is disposable load. High speed is 136 miles per hour; landing speed on water is sixty-seven miles per hour; and landing speed on land is sixty-six miles per hour. The gasoline tanks, which are located in the wings, have a total capacity of 350 gallons. The cruising radius is 500 miles.

The fuselage is of monococque construction. The size of the fuselage enables a clear passageway into the tail and also provides a large space for baggage. The pilot's compartment is entirely enclosed; the roof is of glass and there is vision in all directions. Between the pilot's and passengers' cabins is the operator's and navigator's compartment, and a wide door, with a ladder up one strut, provides access to the passengers' quarters.

The central engine is set low in the nose, and the other two are supported under the wing. The main spars of the wings are built up of duralumin sheet. The leading edge back to the front spar is duralumin sheet, and a metal walkway on top of the wings is provided, with other walkways back to the aileron hinges; otherwise fabric is used as the covering.

THE Air Ministry was authorized by the House of Commons on April 5 to make further subsidies of civil aviation by grants of not more than $5,000,000 annually. These subsidies, in addition to airport facilities, will be granted to companies establishing regular passenger, mail or express air transport services. This subsidation will terminate at the end of 1940.

GERMANY

THE new German steamer, *Europa*, of the North German Lloyd will be equippped with a Heinkel catapult and a fast seaplane for ship-to-shore mail service, according to a recent announcement of officials of the Ernst Heinkel Flugzeugwerke of Warnemunde, Germany, which will construct the equipment. Last year the *Bremen* was equipped with a catapult and an airplane which were used at the end of each trip until the beginning of the winter months when the device was removed. The equipment was reinstalled this spring. The *Europa* installation will be completed this summer.

RADIO beacon systems will be adopted as the chief means of guiding traffic over night air lines in Germany, and lighting systems will be used only to supplement this service under a program announced by the Federal Traffic Ministry. Revolving search lights now in use will be retained and intermediate lights, with the exception of lights marking obstructions, will be eliminated. The country will be divided into fourteen radio beacon districts.

TESTS of an airplane which is reported to have no spinning characteristics have been completed by the German Aeronautical Testing Institute. The plane was developed by the Focke-Wulf Company of Bremen.

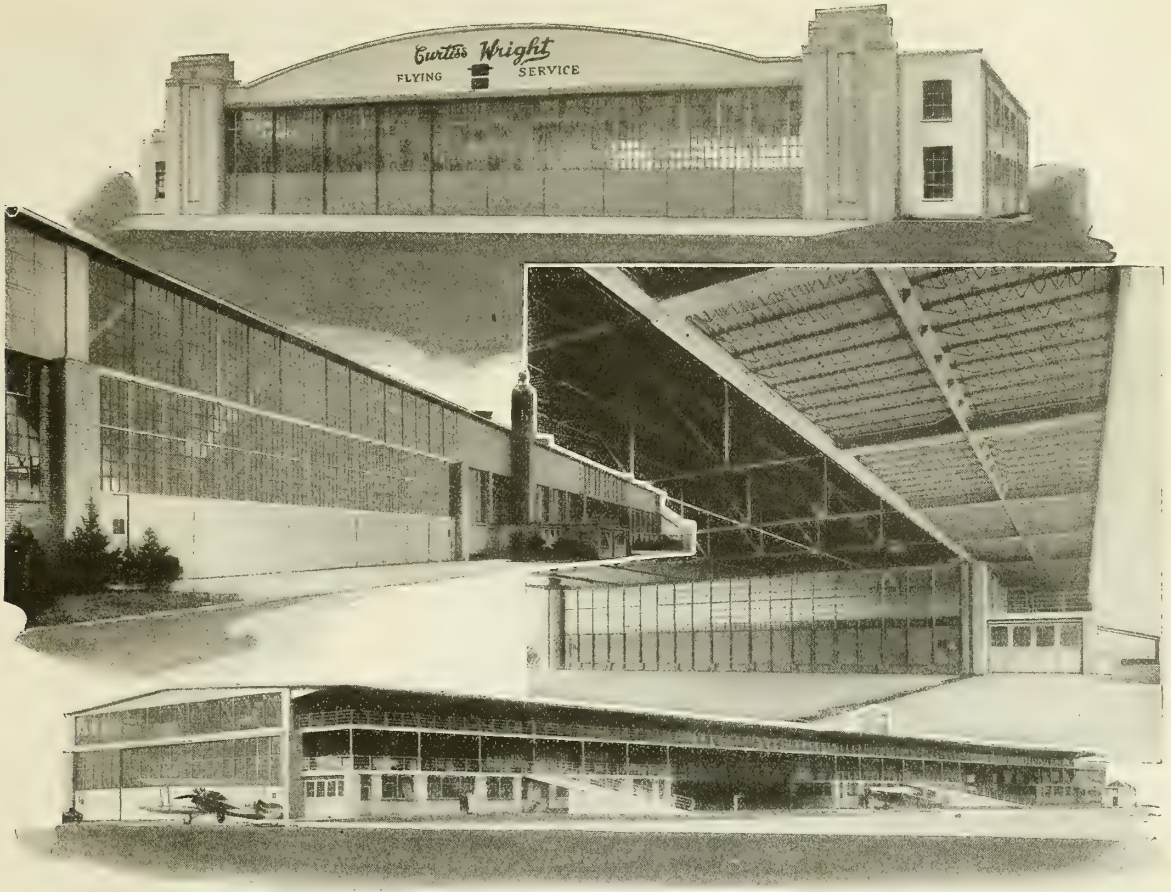
Tests of the plane were conducted with the center of gravity as far forward as possible; with a normal center of gravity; and with the center of gravity as far back as possible. One hundred and ten pounds of fuel were carried in the forward tank. In three test flights which were conducted, the weight of the oil was 22 pounds, 19.8 pounds and 17.6 pounds repsectively. No baggage was carried on the first flight; on the second flight, baggage weighed 121 pounds; and 198 pounds on the third flight. The weight of the pilot in each test was 165 pounds.

(Continued on next page)



(P. & A. Photo)

H. R. H. The Prince of Wales climbing into the cockpit of his plane at the start of a 700-mile flight from Marseilles, France, to Windsor Castle, England



Curtiss Flying Service: Top photograph, Hangar at Dallas, Texas; other photographs, Hangar at Glenview, Illinois. Rebori, Wentworth, Dewey & McCormick, Inc., Architects. Truscon products used throughout.

Attractive—Fireproof—Daylighted—Efficient

The specialized requirements of aeronautical buildings are fully met by standardized Truscon Steel Products at economical cost. In the Curtiss Flying Service Hangar, shown above, Truscon Steel Doors are used throughout, including the large Steel Hangar doors, both Straight Slide and Curved Track types.

The fireproof roof consists of Truscon Steeldecks, insulated and waterproofed. The floors and roofs are supported on Truscon Steel Joists, "O-T" Open Truss and "P-G" Plate Girder types. The concrete is reinforced with Truscon Welded Steel Fabric and Bars.

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Build NOW While COSTS Are LOW

TRUSCON STEEL BUILDING PRODUCTS
FOR AIRPLANE HANGARS AND AIRPORTS

(*Continued from preceding page*)

The ship is a high-wing full-cantilever monoplane. The wing tapers in plan and form and is covered with fabric, the leading edge being of plywood. The fuselage is of welded steel tubing covered with fabric and aluminum sheeting. The walls of the cabin are covered with plywood. The pilot's compartment is located in front of the passengers' cabin under the leading edge of the wing and is provided with a wind screen. The rudder, elevator and ailerons are built of plywood covered with fabric. The fins are unsupported and the rudder is balanced.

[E. P. A. HEINZE]

APRIL 15th was the first closing date for entries in the International Light Plane Tour and seventy-five planes had been entered by that date, according to a recent announcement of officials of the German Aero Club. Of these planes, thirty-four were German. Twenty-three German planes are being equipped with the new Argus motor. One German entrant will fly a De Havilland Moth, powered with a Gipsy engine. Of foreign entries, six are from Great Britain, fourteen from France, sixteen from Poland and four from Switzerland.

[DR. CARL HANNS POLLOG]

A COMBINED wheel and ski landing gear has been constructed by the Junkers Works of Dessau, Germany, and is being tested by the Deruluft company. This company is operating an air service between Königsberg, Germany, and Moscow and Leningrad, Russia, with through connection to and from Berlin. Because of the meteorological difficulties of the routes, it has hitherto been possible to maintain the services only during the summer season. During the winter months airplanes with ski landing gears may be operated over the eastern portion of the routes, because at this time there is generally a snow cover of three feet or more on the Russian airports. This is, however, not the case on the western portions of the routes, where the climate is more moderate; there is sometimes a snow cover and sometimes there is not.

The Deruluft sent during the summer of 1928 a circular to the German airplane manufacturers asking them to design a combination wheel and ski landing gear to be tested on its routes during the winter of 1928 and 1929. It set up the following conditions:

The pilot must be able to land and take off on wheels or sledge-runners on the following kinds of ground; hard-frozen soil with perhaps frozen mole-hills; soaked soil, where a landing on wheels would be dangerous; fine powdery snow, where sledge-runners would be likely to sink; and hard-frozen snow, where the wear and tear of the surface of the sledge runners would be great. The air-resistance of the construction was not to be appreciably higher than that of an ordinary wheeled undercarriage.

Only one of the manufacturers, the Junkers Works, designed such a construction and the first test flight to Moscow was made. The flight was successful and the conditions set up by the Deruluft were fully realized.

AUSTRALIA

AN aerial survey will be made of Central Australia, using a trimotor monoplane *Lasconder*, constructed by the Australian Aerial Services, Ltd., according to a recent announcement of officials of the Australian company. The plane has been chartered by Donald Mackay, sponsor of the expedition, and was scheduled to start from Melbourne May 24, according to the company.

The base of operations of the expedition will be established at Ilbilba, located in the Edrenberg ranges, and flights will be made to the north, south and west. The area covered in the plane will be photographed from the air and mosaics will be made. The territory which will be covered is unexplored by white men.

(*Continued on next page*)

AIR TRAVEL IN TWO GERMAN TOWNS

Commercial Aviation Solved Transportation Problems of Chemitz and Krefeld

By DR. CARL HANNS POLLOG

"FIVE years of Chemnitz Airport" and "Four years of Commercial Aviation at Krefeld" are reports of local aeronautic developments recently published by two German textile towns, Chemnitz, Saxony, near the Czechoslovakian border, and Krefeld, Rhineland, on the Holland frontier. Each report is a resumé of the method by which these cities have overcome handicaps of inadequate shipping and communication facilities by the development of aerial service. Although both towns are the centers of important textile industries, they were left behind in transportation facilities in the middle of the last century when the national and international railroads were being built.

The Chemnitzer Flughafen-Gesellschaft, m.b.h., (Chemnitz Airport Company) was formed on March 5, 1925, with a capital of one-half million reichsmarks. Many industrial and business leaders in the city took part in the capitalization of the new organization, the local aviation activity having had the general endorsement of the town's people from its inception. Plans were made at once for a local airport and work on this project began at once, as did negotiations for the establishment of air transport facilities at Chemnitz with the two large German aviation companies then in operation, the Junkers Luftverkehr and the Deutscher Aero-Lloyd. Airport facilities were not completed in time to inaugurate service during the fall of 1925. With the merging of the two large operating companies into the Deutsche Luft Hansa, this company inaugurated regular air schedule to and from Chemnitz in May, 1926.

Since the beginning of this service, improvements and extensions at the Chemnitz Airport have included the leveling of the airport area, construction of a large hangar, repair shop, storage facilities, and an administration building which houses police, customs and restaurant facilities. Chemnitz now possesses one of the most up-to-date airports in Germany. As the result of contracts with the Deutsche Luft Hansa and the Nordbayerische Verkehrsflug A.G., the city has direct aerial connections with most of the important German towns as well as with Prague, Vienna, and Amsterdam. During the summer, it has aerial service to the Czechoslovakian pleasure resort, Marienbad. During the past four years, the Chemnitz air traffic has grown to a volume that is larger than that of Dresden or Breslau—towns which have from four to six times the population of the textile center. In 1929 the number of passengers was three times that of 1926; and the freight increased to eleven times, and mail to fifty times that of the first year.

The town of Krefeld has built up a system of airplane transportation which has become widely known as the "Krefeld System," and which has adequately solved its need for fast transportation. Although the city had three airports within an hour's traveling time, its aim was chiefly the development of aerial freight service, and it constructed its own airport near its industrial center for this purpose. In 1926 the city contracted with the Deutsche Luft Hansa for an extension of the Berlin-Brunswick-Essen line to Krefeld and for another service to Cologne which would connect Krefeld with Southern Germany, Switzerland, France, Belgium and England. These services were subsidized by the town, and, as the results of the first year's operations were decidedly unfavorable, the local council early in 1927 drew up another contract with the Luft Hansa which incorporated the significant features of the "Krefeld System." The contract stipulated that no flight was to be made unless there was a sufficient number of passengers, mail, or freight to be carried, and that the subsidies were to be paid according to the number of flights made instead of in a fixed amount.

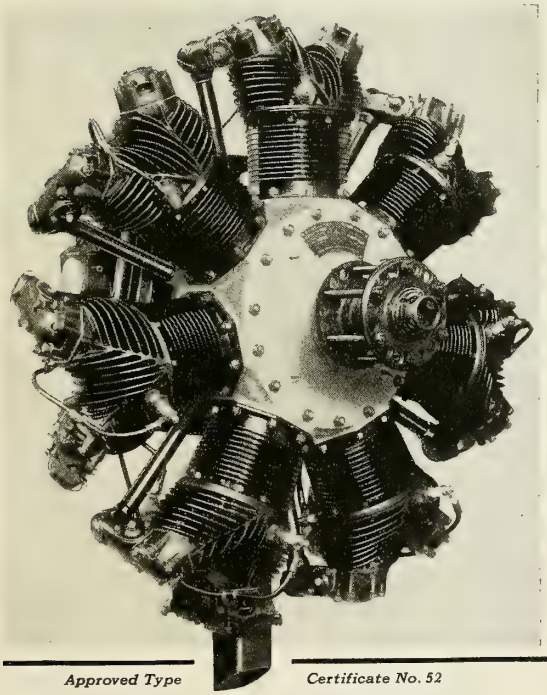
The schedule called for four flights each day between Krefeld and Cologne, and three flights a day between the textile center and Essen. With the inauguration of this service the communication department of the city started an extensive advertising campaign among business men of the region advocating the use of the airplane for freight shipping. The combination of a fixed schedule and a service only on demand proved a business-like measure in saving the town a large amount of subsidy. As the advertising campaign of the city's officials began to show an effect among the leaders in the textile industry of the region, the volume of traffic on the service began a steady increase. Large amounts of expensive textiles, including silks, are manufactured in Krefeld, and aerial service proved most profitable to the textile producers for the shipment of such material. Many of the firms in the industry now ship more than half of their total production as aerial freight, others sending eighty, ninety, and one as much as ninety-seven, per cent of their products by airplane.

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Without a recommended change

THE NEW LEBLOND "110"

Approval by the Department of Commerce without a recommended change, is a tribute to Le Blond leadership in design. Just glance at the specifications and you will know why the new Le Blond "110" is the most compact plant for its H. P. yet developed - - smaller in diameter, shorter in overall length, more H. P. per cubic inch displacement - - cool, sweet running, with famous Le Blond Unit Assembly - - it is the power plant of tomorrow for you today.



Approved Type *Certificate No. 52*

Specifications . . . . Le Blond "110" - - Model No. 7-DF

Type	*7 cylinder - - Radial - - Air Cooled*		
Approved Rating	*110 H. P. at 2150 R. P. M.*		
Displacement	*372.4 cu. in.*		
Bore	*4.250 in.*	*Compression Ratio*	*5.4:1*
Stroke	*3.75 in.*	*Overall Diameter*	*33.25 in.*
Fuel Con.	*52 lbs/H. P./Hr.*	*Overall Length*	*23 in.*
Oil Con.	*.015 lbs/H. P./Hr.*	*Weight (less Hub)*	*275 lbs.*

LE BLOND AIRCRAFT ENGINES

Send for details, facts and figures on the outstanding power, economy and special features of the new Le Blond "110". The price is right, consistent with Le Blond advanced engineering and quality standards. THE LE BLOND AIRCRAFT ENGINE CORP., CINCINNATI, U. S. A.

AIRCRAFT ENGINES LE BLOND MADE IN THE U.S.A.

(Continued from preceding page)

The personnel of the expedition will include Comdr. Bennett; Kingsley Love, radio operator; and Capt. Frank Seale, pilot.

A TOTAL of 1,443,507 miles were flown over by planes of Western Australian Airways of Perth, Australia, up to March 3, according to a recent announcement of officials of the company. On the Perth-Derby route a total of 7,155 passengers were carried; and 2,528 passengers were carried on the Perth-Adelaide route. Taxi rides totaled 13,490. Mail carried on the Perth-Derby route up to December, 1929, totaled 1,667,169 pounds; and on the Perth-Adelaide route, 73,611 pounds. Express carried on the Perth-Derby route totaled 292,128 pounds; and on the Perth-Adelaide route, 12,946 pounds.



Boeing six-place flying boat used in passenger service in Alaska

CANADA

THE Fleet Aircraft of Canada, Ltd., started production May 1 in its new plant at Fort Erie, Ont., according to a recent announcement of company officials. The Canadian company is an entirely separate organization from the Fleet and Consolidated companies of the United States, and the Fleet sport plane of the new plant will be manufactured under a Canadian Airworthiness Certificate. The company has been organized with a Dominion charter in Canada and is financed by Canadian and American capital.

The new plant is constructed of brick and steel. For the first year the plant will be used exclusively for the manufacture of the Fleet Model 2 sport plane for both land and water use.

[J. MONTAGNES]

THE Civil Aviation Branch of Ottawa recently issued a report of aeronautical activities in Canada in 1929. There was a total of 124,751 passengers carried, nearly double the number carried in 1928. In addition, over 3,903,000 pounds of freight were carried by planes last year, an increase of about 1,500,000 pounds over the amount carried the previous year. The total mileage of the air mail routes now operated under contract with the Canadian post office department is 5,139 miles. Of 2,334 trips scheduled last year, 2,152 were successfully completed. Approximately one-half million miles were flown over the air mail routes in 1929.

THE Dominion Air Industries, Limited, recently leased a site and factory with option of purchase at Medicine Hat, Alberta. The flying field leased by the company is 268 acres in extent.

[A. F. ROBERTS]

CONSTRUCTION of buildings at Vancouver's 460-acre airport on Sea Island, for which ratepayers voted $600,000 last year, has started and it is planned to hold dedicatory ceremonies July 1. The eastern half of the site will be developed first, and two main runways and two municipal hangars will be erected. The site was purchased last year at a cost of $300,000 and plans for the terminal were prepared by William Templeton, airport superintendent, a former Royal Naval Air Service pilot, after an extended tour of airports in the United States.

BOEING Aircraft of Canada, has applied for lease of a ten-acre site at the Vancouver airport and will move its plant to the new location. Western Canada Airways, Ltd. and Dominion Airways, Ltd., have applied for leases of waterfront sites at the field and will operate both land and seaplanes from a central hangar.

The two municipal hangars which will be constructed immediately will be 100 feet by 100 feet each, with door openings 100 feet wide and twenty feet high. One will house seaplanes and flying boats and the other will be for landplanes. It is expected that the construction of the 2,400-foot runway, the 1,900-foot runway and two hangars will be completed by July 1.

PLANS formulated by a special committee of the Industrial Development Board of Manitoba will provide Winnipeg with an airport for land and seaplanes. The plans have been approved by the Civil Aviation Branch at Ottawa and include the development of a field of 3,000 acres.

MEXICO

[M. HURST]

TAMPICO is to have its own gliding club, according to an announcement of Sam E. Judd, field manager of the airport at Tampico. A movement has been started to organize a club which will purchase a glider and obtain a gliding instructor. A survey to locate suitable gliding terrain was completed in April. The club will be of unlimited membership pending the development of the organization. K. K. Hoffman will be the instructor for the club.

PLANS are being made for the inauguration of the new airport at Guadalajara. The program of events includes acrobatics by military and civilian planes.

AS a result of the successful trials of a seaplane at Veracruz recently the Department of War and Marine plans to build twelve of these planes to be used in coast guard work. They will be flown by pilots of the air forces.

EFFECTIVE April 1, all civil airplane pilots are required to have a Mexican license if they fly in Mexico.

INFORMATION has been received from the governor of Chiapas that flying fields will be established at Tonala, Arriaga, Tacalco, Suchiate, Comitan, San Cristobal, Las Casas, Tuxtla Gutierrez, Cintalpa and San Bartolomé. Two emergency fields are being built and several others are planned.

A BOWSER system has been installed at the new airport in Tampico for the convenience of planes of the Cia. Mexicana de Aviación and private ships. The Aguila Oil Company installed the system on the field. Engineer de la Barra was in charge of the work.

GUATEMALA

THE Irigoyen-Alejos Airline, has been awarded a contract by the Guatemalan government, for the transportation of mail and passengers between cities and towns in the interior of Guatemala. According to the terms of the agreement, the airline established the first route from Guatemala City to other points in the interior, the operation being inaugurated April 29th. The Irigoyen-Alejos plans to connect by air many important cities in Guatemala.

[H. C. PLUMMER]

GUATEMALA, the Central American republic which adjoins Mexico on the south, has adopted a definite aviation policy, and one of the first acts of Lazaro Chacón, recently elected president of the republic, was the creation by executive decree of the Dirección General de la Aeronáutica Civil. This branch of the administration will function under the supervision of Arturo Aguirre.

(Continued on next page)

MOTO METER AVIATION INSTRUMENTS



CHARACTER

IN PILOTS—as in other men—it is quite obviously *character* that counts. *Character*—a word very hard to define, but that invariably makes its owner stand out from the general run.

If inanimate objects at all have something that may be called character, the Moto Meter line of aviation gauges has. But in products is it not also *the character of the organization behind them that counts?*

For nearly twenty years Moto Meter has made fine instruments. It has pioneered them and seen them become standard equipment. It has devoted constant effort toward making them simple, reliable and positive in operation.

Small wonder then that Moto Meter aviation instruments (some of which are illustrated below) are found on the panels of the big air liners, of much smaller commercial, private and service craft, and of the experimental planes that have carried so many names to fame.

Moto Meter aviation instruments in the pilot's cockpit are a sign of *character.*

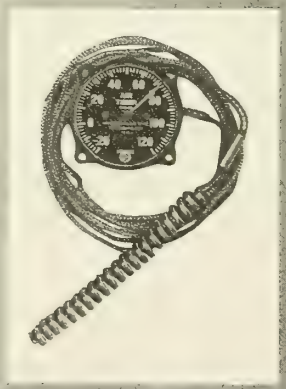




Model 2893A Oil Pressure Gauge
(Illustrated above)
Built to stand vibration and shock.
Conforms to government specifications.

Model C Motor Heat Indicator
(Illustrated on left)
The finest instrument of its kind.
Conforms to government specifications.

Model CA Ice Warning Indicator
(Illustrated on right)
Warns pilot when atmospheric conditions favor formation of ice.





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(*Continued from preceding page*)

Included in the work of the Dirección General de la Aeronáutica Civil are the study of aerial navigation laws and legislation governing civil aviation; the organization of aerial police; study of aerial routes; the classification and development of airports; the solicitation and classification of technical information gathered by the diplomatic and consular representatives of Guatemala; the study of aircraft radio, meteorology, aerology, aircraft lighting and aerial mapping; the establishment of a library on aviation; and development of aviation publicity.

The ports of Puerto Barrios, Amatitlán, San Lucas Toliman (Atitlán) and Flores (Petén), with their respective customs facilities, will be adapted to accommodate air transport services. The construction and development of airports will be a principal activity of the department, and airports will be developed at Guatemala City, Retalhuleu, Quezaltenango, Huehuetanango, Quiché, Salamá, Zacapa, Jalapa, La Libertad and Flores.

Aircraft must be registered as to nationality, passengers, crew, baggage and cargo, preparatory to flying over Guatemalan territory.

BRAZIL

Transatlantic Air Mail Test Flight Completed at Natal by Mermoz

A TRANSATLANTIC flight of 1,975 miles from St. Louis Senegal, Africa, to Natal, Brazil, preparatory to the establishment of an ocean air mail service, was completed on May 13 by Jean Mermoz and two companions. The flight was sponsored by the Compagnie Generale Aeropostale, S. A., which plans to establish the transatlantic air mail service between Europe, Africa and South America.

The flight was completed in approximately twenty hours and fifteen minutes after taking off from St. Louis where the plane had picked up the mail from the regular Toulouse-to-St. Louis mail plane. The plane carried fuel sufficient for thirty hours of flying. The personnel of the flight was comprised of Jean Mermoz, pilot, D'Arby, navigator, and Gimie, radio operator. After completing the east-west flight from Africa to Brazil, Mermoz announced that a return flight would be made to Senegal.

PLANES operated by the Compagnie Generale Aeropostale, S. A., had flown a total of 1,056,380 miles over scheduled routes in South America at the end of 1929, according to a recent announcement made by Marcel Bouilloux Lafont, president of the company, while on a visit recently to inspect the South American organization of the company. The company operates air transport lines in Africa and South America. It plans to extend its lines to cover the entire South American Continent and to join these to Europe by a transatlantic airplane service.

The Compagnie Generale Aeropostale, S. A., was established for the purpose of uniting all of the South American countries by a network of airlines and putting these countries in connection with France by means of steamship service and the airlines in operation in Africa. At present the company maintains weekly air-steamship schedules between Europe and Brazil, Argentina, Uruguay, Chile and Paraguay. Venezuela recently awarded the company all contracts for air mail destined for Europe, and Chile has given the company contracts for air mail to Bolivia, Peru and the United States.

The Compagnie Generale Aeropostale, S. A., will extend the present air routes over the northern borders of Brazil and over Natal and Belem to the Guianas, Venezuela and the French West Indies, according to the statement made by M. Lafont.

Present plans include the establishment of a transatlantic air transport service between France and Buenos Aires by way of Africa, requiring three days to complete the trip and eliminating the steamship service now in operation between Dakar, French Senegal, and Natal, Brazil. The company will use large high-powered transport planes for this transatlantic service.

These ships will develop a high speed of 147 miles per hour. Each plane will be equipped with a cabin having a capacity of eight passengers and containing a baggage compartment. The Aeropostale company plans to inaugurate air service with ships of this type on the route between Pernambuco, Brazil, and Buenos Aires, Argentina.

ARGENTINA

Activities of the Aero Club Argentino

THE Aero Club Argentino has started the organization of plans for the celebration of the Aeronautical Congress under the auspices of the Federation Aeronautique Internationale, of which the Aero Club is the Argentine representative. The Aeronautical Congress will be held in conjunction with the International Aeronautical Exposition at Buenos Aires at the end of 1930.

The Aero Club Argentino was founded in January, 1908. The club was instrumental in the development of the El Palomar Airport, and has donated planes and equipment for military aviation in addition to hangars. The club established the first aviation school in South America and presented it to the government for the training of the Air Corps personnel. Senor Florencio Parravicini is president of the club. The Aero Club Argentino presented a balloon field to the Naval Aviation School at Fort Barragan, and donated planes to the Air Corps.

Numerous flights and races have been sponsored by the Aero Club, including the first baloon flight over the Andes which was performed by Bradley and Zuloaga; Major Zanni's Amsterdam-Tokio flight; Etcheberry's flight from Buenos Aires to Mar del Plata and Montevideo; Hillcoat's flight from Buenos Aires to Lima. The club has entered ships and balloons in several international races including those held in South America for the Wilbur and Orville Wright Trophy and entered balloons in the Gordon Bennett races in 1928 and 1929.

URUGUAY

THE committee in charge of the aeronautical program included in the celebration of the Uruguayan Centenary has announced that the route for the Pan American Air Races which will be held under the auspices of the government of Uruguay, in conjunction with the Aeronautical Salon, will include cities in Argentine and Brazil not included in the initial route. The celebrations will take place at the end of 1930.

CHILE

THE Chilean National Airlines are now operating a tri-weekly air service in both directions between Santiago and Arica. Chilean National has recently acquired three Ford trimotor planes. Planes arrive at Arica on Mondays, Wednesdays and Fridays, and leave for Santiago Tuesdays, Thursdays and Saturdays. Over-night stops are made at Antofagasta. The air trip from Arica to Antofagasta is made in four hours and twenty minutes and from Antofagasta to Santiago, the capital, in eight hours and thirty minutes. All the officials and pilots of the organization are Chileans.

INDIA

FORTY-NINE airports and landing fields in India are available for use by civilian aircraft. There are three airports of the Royal Air Force; twenty-four approved airports and landing fields under the supervision of the Royal Air Force other than those for military or civil use; twelve landing fields under the supervision of the army; six government civil airports; one government civil landing field; and three landing fields in the Indian states.

No permission is required for civil aircraft to use government, civil or airports of the Royal Air Force, or government civil landing fields and those under the supervision of the Royal Air Force. To land on fields under the supervision of the army, permission must be obtained from the commanding officer at the station. Permission to use the landing fields of the Indian states must be previously obtained from the Darbar. No housing accommodations are available at the fields.

Landing and housing charges at the airports are made according to the amount of floor space occupied. Gasoline, oil and equipment may be obtained at airports of the Royal Air Force, and only repairs necessary to enable the airplane to proceed immediately will be made at these airports. Telephone and telegraph facilities at Royal Air Force airports are permitted only in cases of emergency; these facilities are provided as far as possible for the use of pilots at government civil airports and landing fields. The government of India will endeavor to notify the public when the flying fields are not in good condition, but no guarantee is given that such fields are usable or that notification of such conditions will be made.

Unusual *BARGAINS* in surplus equipment

You can now obtain at really bargain prices planes of any type and almost any preferred make in our remarkable sale of the surplus equipment of the various subsidiaries of The Aviation Corporation. In our desire to move these ships quickly into the hands of pilots who can make use of the many hours of flying they still afford, we have set unusually low prices on them.

Every one of these planes was thoroughly inspected and overhauled last winter in preparation for summer operations on transport lines, and for school and charter flying. The decision to dispose of this equipment came as a result of the formation of the American Airways Corporation to consolidate the transport activities of subsidiaries of The Aviation Corporation, and also through a change of policy affecting schools and charter flying. The planes, therefore, are "surplus equipment" in every sense of the term. With one or two exceptions they are licensed for commercial operation.

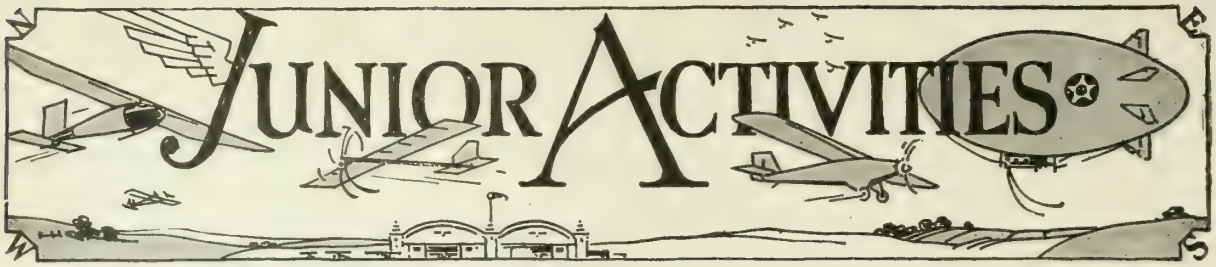
It is impossible to list here all the many bargains obtainable in this sale. A few typical examples are given below:

D. C. No.	PLANE	Type	Motor	FLYING TIME Type	Plane	Motor	Location	Price
415-K	Fleet	No. 2	Kinner	K-5	74:30	91:10	Albany, N. Y. ...	$2,361
NC-7584	Ford	4-AT	Wright	J-5	512:50	1180:50	St. Louis, Mo. ..	20,500
C 9520	Waco	10	Curtiss	OX-5	429:00	43:00	Cincinnati, O....	1,100
C 123-E	Curtiss-Robin	B	Curtiss	OX-5	364:00	442:00	San Antonio, Tex.	1,500
NC 7426	Lockheed	Vega	Wright	J-5	200:00	210:00	Stl Louis, Mo. ..	4,000
NC 8883	Travel Air	B-4000	Wright	J-5	190:00	633:00	Fort Worth, Tex..	3.800
NC 4728	Stinson	S-M-I-B	Wright	J-5	691:00	141:00	Tulsa, Okla.....	2,500
C 5085	Stearman	C-3-M-B	Wright	J-5	207:15		St. Louis, Mo....	3,500
NC 9133	Fokker	Super-U.	P. & W.	Wasp	334:20	335:20	St. Louis, Mo.....	8,000
NC 9138	Sikorsky	S-38-B	P. & W.	Wasp	176:42	176:42	Buffalo, N. Y.....	30,000
NC 9708	Fairchild	71	P. & W.	Wasp	544:49	656:28	Murfreesboro, Tenn.	9,800

All plans are offered subject to prior sale. Please address all inquiries to Farmingdale, where they will be promptly forwarded to Fairchild representatives located in Atlanta, St. Louis, Chicago, Dallas and Los Angeles, or the Fairchild dealer nearest you. We suggest you write us at once, for bargains such as these will be snapped up quickly.

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Division of The Aviation Corporation



MODEL SAILPLANING

YOUNG AMERICA'S NEW SPORT

By

R. E. DOWD

"HEY there, boy! Let's see your model." The speaker was W. Hawley Bowlus, American soaring champion, at the Bayside, Long Island, glider meet May 2nd. Youthful and bashful Albert Berwick of 472 Bayview Avenue, Cedarhurst, Long Island, responded to this unexpected honor and brought his "Junior Albatross" over to the famous glider pilot whose long list of achievements includes building Colonel Lindbergh's *Spirit of St. Louis*.

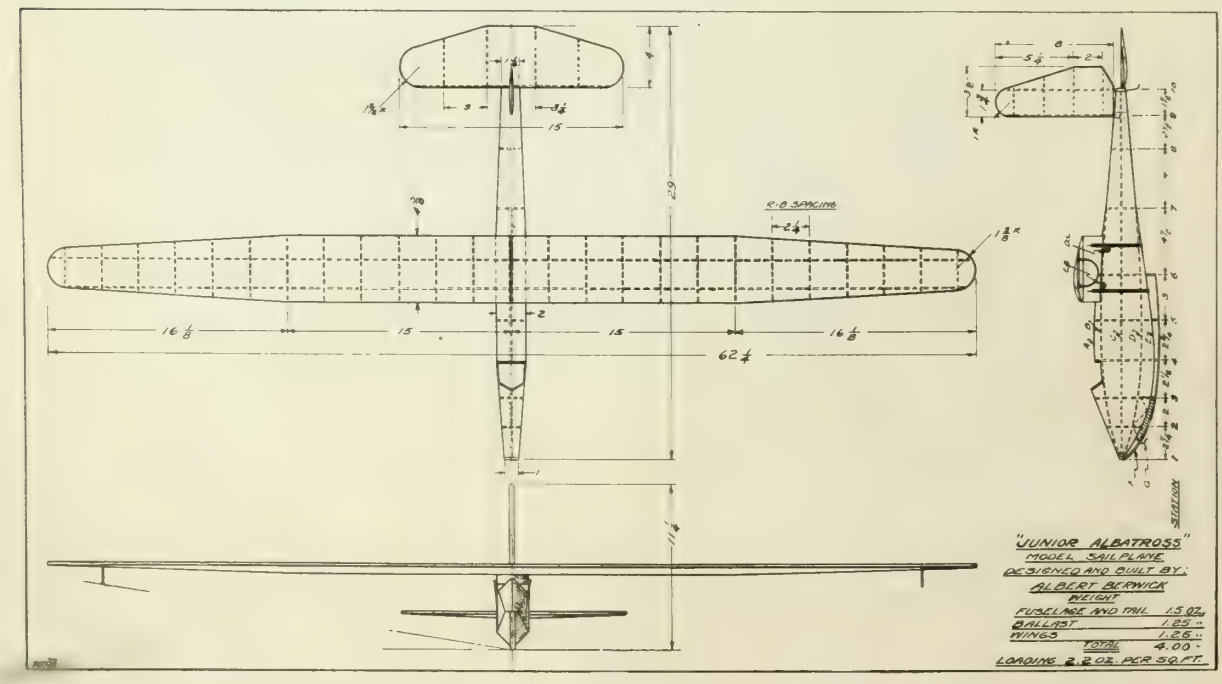
"What does she weigh?" Mr. Bowlus queried as his skilled eye examined its details and noted the marked resemblance to his mighty sixty-foot soaring "Albatross" which he had just assembled for the competition. "Did you have any drawings to work from?" continued Mr. Bowlus. Albert explained that the weight was between three and four ounces, depending upon the amount of ballast used, and he had done his best to make the model one inch to the foot in scale after the design of the Bowlus Albatross, working only from pictures he had seen in newspapers and magazines.

About this time your Junior Activities editor persuaded Albert to pose under the great wing of the Bowlus sailplane for the picture that we have in this article. Just note that smile! Al seems to feel pretty good about what our national glider champ said concerning his model.

But at this point the fun hadn't begun. Before the day was ended Al was going to beat the champion's record for the day. Launched from the hilltop of the Queensboro Golf Club course, against a rather light prevailing wind, Mr. Bowlus was able to make a duration of fifty-five seconds, while Al Berwick made better than a minute and a half!

Here's the secret. A hundred yard spool of No. 50 cotton thread. That's more perplexing than ever you will say. The point is that our friend from Cedarhurst has not only made an excellent model sailplane, but has devised a new means of launching using a spool of thread, much in the same manner as a tow line is used on full size gliders. The method is simple.

The model is placed flat on the ground headed into the wind. An assistant holds it down so that wind gusts do not upset it before taking off. A large loop about 1½ inches long is made in the end of the thread and slipped over the hook in the glider. (See detail *G* in side view of model.) The "pilot" now takes his place at the end of the thread 300 feet distant. Signals are exchanged and the "pilot" races away, running into the wind. The sailplane takes off at once and climbs gracefully. The "pilot" watches over his shoulder as he runs, and as the model banks, he quickly changes his course toward the high wing. Up she comes level, just like pushing the stick over in the cockpit of a real plane. In just a few seconds the Junior Albatross is 100 to 200 feet in the air. The "pilot" stops running when he has enough altitude and the thread slides from the hook by the air resistance and there we are. Our Albatross soars high up in the air in free flight. Back and forth she cruises, now banking majestically for turns, then pulling up on a rising current and actually gaining altitude!



With a gliding angle of about fifteen to one and a flying speed of about eight to ten miles per hour, our sailplane is sure to give us a marvelous demonstration. Isn't this a wonderful new sport?

Model gliders have been made for years, but always the launching problem loomed up in the foreground. Launching from an elevation meant descending to recover the model or a tedious hauling up on a string with the inevitable knocking about to disturb the adjustment for the next flight. Elastic slings require strong, relatively heavy models, with poor gliding angles and high sinking speeds. Furthermore, a sling propelled model usually exhausted its power making loops or circles without gaining appreciable altitude, except in cases of very careful adjustment and skillful flying.

These are the reasons that we feel Young America will take up this new version of model sailplaning with real interest and enthusiasm. And what a great opportunity for a model sailplane contest! No limit to size or weight—just the length of the thread. Here's a contest where design, construction, adjustment, operation and selection of terrain all count. Competitions for both distance and duration can be run and the models will ordinarily stay within sight of the judges and spectators, which circumstance always tends to make a contest more popular.

Then there is still another possibility for our new sport of model sailplaning, for our flying models can now also be exact scale models. We can have working controls, rudder, elevators, and ailerons; we can have even a dummy cockpit and a pilot if we choose. Every rib and strut can be duplicated if we can see fit, and the performance of our model will not suffer to any great extent. In short, it would seem that the model glider or sailplane is at last the answer to the time-worn controversy among model builders as to which is more important, the scale or flying model, for it is both at once.

So much for the new sport and its possibilities. Let's now go to work and build the Junior Albatross. The three-view drawing shows the details of construction as completely as is possible for an assembly drawing, and the photographs will bring out some of the more important details.

The Fuselage Should be Built First

The entire framework of the model is balsa wood and bamboo; the only wire parts consisting of nose hook *G* and the tail skid. If it is desired to make the plane in halves and the fin removable as Al Berwick did for transportation in crowded subways and elevated trains, then we must add four lollipop sticks to our bill of material with short lengths of aluminum tubing to fit.

We make our fuselage by first making two side frames perfectly flat. These frames are made of longerons *B* and *D* with cross struts at the different stations as indicated. The lengths of the struts are given in the following table:

Station Number	1	2	3	4	5	6	7	8	9	10
Side Struts (inches)	0	1⅜	2¼	2¼	2⅜	2½	2	1⅜	⅞	¾

Like the longerons, these struts are of balsa ⅛ inch square. When the two frames are all assembled and cemented together with Ambroid cement, the stringers *C*, 1/16 by ⅛ inch, are cemented in place to each strut. The frames are now lifted from the board or work bench on which they were built and the top and bottom bulkheads cut to size. They are triangular pieces of balsa ⅛ inch thick, cut of such a width that the fuselage side frames will be spaced apart to the outside dimensions given in the top view. It is, of course, not necessary to build the cockpit, but it adds so much to the appearance of the model, as well as providing a means of access to the fuselage for changing the ballast, that it is well worth the additional time and effort.

Balsa wood pieces 1/32 inch thick are used to cover the whole top of the fuselage between stations 4 and 7. This covering gives a strong, rigid construction to the top of the fuselage, permitting the wing to be moved forward and backward for adjustment.

At station 7, the "Vee" shaped top and bottom of the fuselage changes to flat, so that the cross section is rectangular back to the very end. Station 9 mounts the front or leading edge of the fin and is made ½ inch wide. If the fin is removable, a short aluminum tube is ambroided in place to receive the lollipop stick, also ambroided to the balsa spar. This tube may be rolled from sheet aluminum around the stick as a form. Station 10 is formed of a solid piece of balsa and has the tube cemented to its front face.

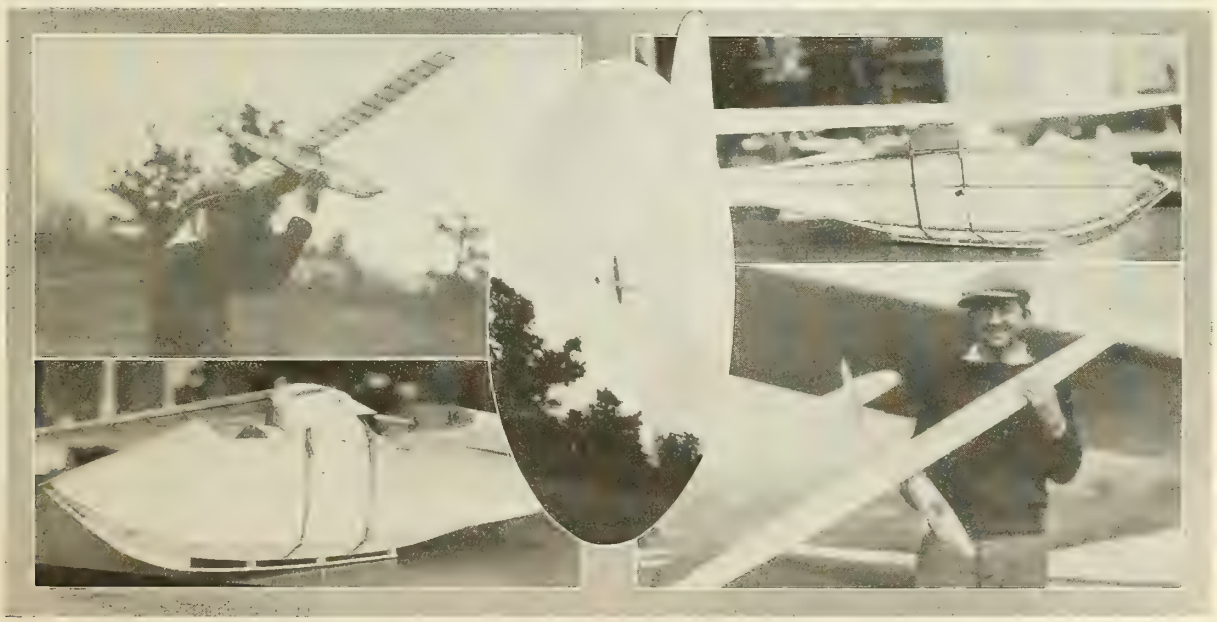
The skid is of balsa ⅛ by ½ inch, spaced from the bulkheads by extensions ½ inch wide. The hook is of light music wire, formed as shown, upward to station 2 and then downward to support the skid from landing shocks, then upward to station 3, where it bends over for final anchorage to the bulkhead. The space from the hook to station 3 is filled in solid with balsa wood for reinforcement.

After the frame is finished it is ready for covering with Japanese rice paper, doped enough with banana oil to make it tight and smooth.

The Fin and Stabilizer Are Next

As shown in the drawing, the fin is built up on two balsa wood spars and a bamboo trailing edge. The ribs are also of balsa and are "double cambered" and symmetrical. These terms have been explained before in our department, so that we should know them. For the sake of review, we can mention that "double camber" means both surfaces are curved outwardly and since the

(*Continued on next page*)



The Junior Albatross, its designer, Al Berwick, and a view of it in flight at Central Park, New York

section is "symmetrical" they are of the same curvature. The plan view shows the approximate shape of the fin ribs. As mentioned before, the fin can be made removable by using lollipop sticks for extenisons for the spars and inserting these in sockets fitted to the bulkheads. The covering is the same as the fuselage and is, of course, applied to both sides.

The stabilizer construction is like the fin, but the rib form is different, being a regular airfoil curve with a flat bottom. The two center ribs are ½ inch thick from thickest point, which is 1⅜ inches from the leading edge. The outer ribs have the same general form. When covered, the stabilizer leading edge is cemented to the station 10 bulkhead upside down—that is, as we can see in the side view, with the flat surface upward and on an exact line with the stringers *C* of the fuselage. In other words, it has a zero angle of incidence.

Now Build the Main Wing

The spars of the main plane are ⅛ by ⅜ inch balsa, both front and rear, while the entire outline is of bamboo about 1/16 inch square. The section of the ribs is very much like the stabilizer, being flat on one side and a smooth easy curve which reaches a maximum of ¾ inch for the 4⅝-inch ribs. The point of greatest depth is 1⅝ inches from the leading edge.

All ribs are 1/16 inch thick solid balsa, and the spars slot through the ribs entirely clear of the covering, except at the very tip. A good method to follow is to draw a pattern of the main rib; then draw the various other ribs inside the master form. In this way, the similarity of form can be retained without a great deal of tedious scaling. As shown in the drawing, the taper does not start until a point 15 inches from the center is reached. The best procedure is to lay the design out on a board or work bench to full scale, so that each part can be fitted in its place and the whole assembly cemented together, while being held down temporarily with pins.

If the wing is to be made in halves, one right and one left wing, again lollipop sticks and tubing are used for the center joints, as shown in the photograph. A1 made one socket on one side and the other on the opposite side to preserve the lateral balance. This is splendid attention to detail, but we know that it would take only the slightest variation in the angle of incidence in a wing tip to counteract this many times.

After the wing frames have been covered and doped we have only the mounting to work out. The photographs again will help us with the details. A solid block of balsa wood is cut to fit over the fuselage at a point about station 6. This block is 2 inches wide and has a flat surface 2½ inches above the stringer *C* and also parallel to it. In other words, this surface is at zero incidence like the stabilizer. The wing lays flat on this surface, being held in place only by a projecting fin of sheet aluminum, which has two holes drilled in it to take the spar extensions made from lollipop sticks. The aluminum is cemented in a deep groove in the block and projects up to match the top surface of the rib form.

The mounting block is held in position by two ⅛-inch flat strands of rubber, which loop over hooks in the block and pass around under the fuselage.

Balance, Adjustment and Flight

Sufficient ballast in the form of wire solder, or any convenient weight, should be placed in the extreme nose of the fuselage and cemented in place. The amount of ballast necessary can be determined by completely assembling the model and locating the leading edge of the wing 1¾ inches forward of station 6. The center of gravity should be about 25 per cent back from the leading edge. Finer flight adjustments can be made by sliding the whole wing forward or back as required.

If we make a paper pattern of the side view of the sailplane and balance it on a pinpoint to find the directional center, D.C., as described in last month's model article about Bantam, the flying rooster, we will find it comes about 2⅜ inches back of the C.G. Applying our formula, this gives us: Span 62¼, plus length 29, or 91.25 and 2⅜ or 2.375=.026, which is within our general formula of .025 to .050. Of course, this is merely an interesting check of the formula, as the model was worked out without using it and has proved a splendid flier.

$$\frac{}{91.25}$$

By moving the wing forward or back, we change both our side view and our C.G. so we can study different adjustments.

We have covered pretty well the methods of flying in the beginning of this article, and there is no necessity for repetition. We cannot refrain from saying that if you have made your model carefully you have the greatest treat of your model experience ahead of you when you take it out for trial.

Here Are The 4 Big Reasons They Choose
MARSHALL FLYING SCHOOL Inc.
MARSHALL, MISSOURI



1. **Sensible Prices.** An efficient organization—the result of long experience—has enabled us to reduce our prices to students. Considering the uniformly high quality of our training, you will find our prices the most reasonable in the United States. Unlimited solo flying—$7.50 per hour.

2. **Competent Instructors.** Our instructors are all experienced aviators—with enviable records of performance. They take pride in turning out finished, efficient fliers—and take a personal interest in every student.

3. **Modern Equipment.** Every flying student receives training in the Barling NB 3 low-wing, all-metal structured monoplane—and other new production planes.

4. **Ideal Location.** Marshall is in the center of the world's greatest aviation territory. The school is affiliated with the Nicholas-Beazley Airplane Company, Inc.,—makers of the Barling NB 3 and the world's largest distributors of aeronautical parts and supplies. Living expenses in Marshall are cheap—surroundings pleasant.

Send this coupon today for more detailed information and our folder, "Win Your Wings."

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Department A, Marshall, Missouri

Please send me your booklet "Win Your Wings" and other information on your popular priced courses.

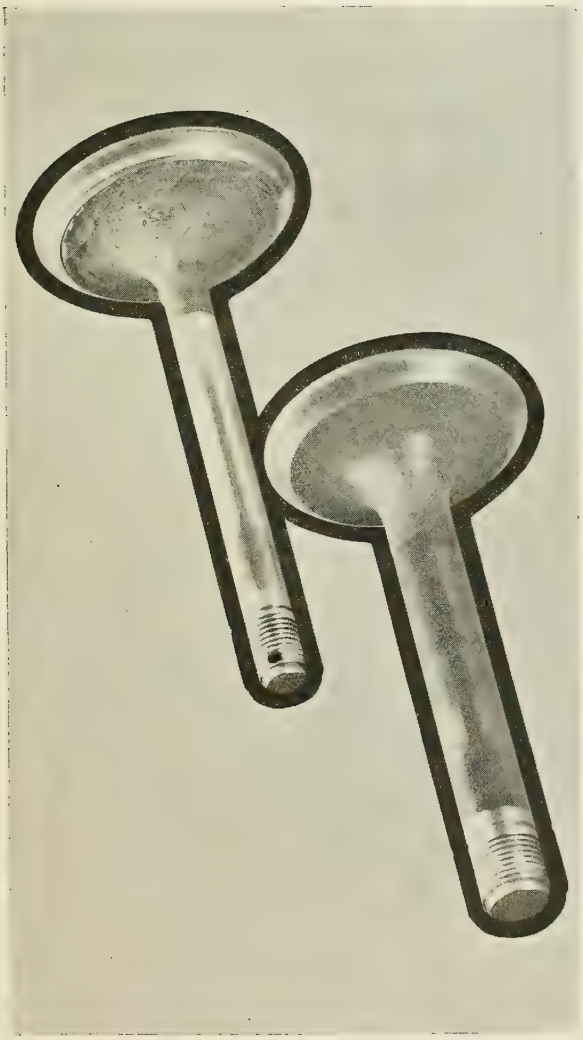
Name .....

Address .....

Thompson Valves from Famous Cylinders



(This advertisement is one of a series showing Thompson Valves from some of the historic aero motors that used them in setting new world's endurance records)



Unretouched photograph of two of the St. Louis Robin's 12 Thompson Valves after 420 hours of continuous flying.

. . . from the "St. Louis Robin"

WHEN the St. Louis Robin exceeded the Angeleno's endurance flight by 174 hours, Thompson Valves once again vanquished their own previous world's record. For, *both* of these famous ships relied on Thompson Valves to bring them through the long grind.

And even after the grueling service of 420 hours in continuous operation, the Thompson Valves in the St. Louis Robin were in perfect condition. Two of them, removed shortly after the flight, are illustrated on this page. Their condition is typical of all twelve that flew with this ship.

Repeated practical demonstrations of exceptional stamina such as this explain why Thompson Valves are used today in 95 per cent of all American aero motors.

THOMPSON PRODUCTS, INCORPORATED
General Offices: CLEVELAND, OHIO, U.S.A.
Factories: CLEVELAND and DETROIT

Thompson Valves

AIR-HOT AND OTHERWISE

(*Continued from page* 66)

the active aircraft industry."

As a result of these representations, about twenty-nine pages of advertising were sold at $250 per page, with preferred positions at a higher rate. Less than 15,000 of the 25,000 programs printed were sold or legitimately circulated.

A fair sample of a form of advertising quackery to which the whole legitimate advertising world is opposed. A crude racket, such as might be expected from the less scrupulous members of a New York political club, but not to be expected from the Aeronautical Chamber of Commerce of America. It was unworthy and never should have been countenanced by the Chamber's show committee. It is another case of sorry management and poor judgment on the part of those supposed to act efficiently and wisely.

The arrangements governing the handling of the so-called directory were about as follows:

A contract was made with a firm to exploit the job. A twenty per cent sales commission, financed by the Aeronautical Expositions Corporation, was paid in weekly sums on receipt of approved contracts. Twenty-five per cent of the gross returns from the retail sale of the directory was paid to the promoters for complete handling and selling. The net profit accruing from sales and advertising was divided, forty per cent to the promoters and sixty per cent to the Aeronautical Expositions Corporation.

Perhaps some of you who attended a meeting held during the Chicago show recall a motion made by Charles Lawrance wherein it was unanimously resolved "that no national shows be authorized which are gotten up and run by professional promoters." This same Charles Lawrance is chairman of the show committee which must have sanctioned this directory.

Consistency thou art a jewel!

Now, stockholders of the Aeronautical Expositions Corporation, it is obvious that your money was used to finance this undoubted racket; that events of this kind have no rightful place in the history of the Aeronautical Chamber of Commerce. The Chamber has a general manager whom we members pay $12,000 annually for what he is supposed to do. If he doesn't do it, we are out of luck. In this case we are out of money—$20,000 to $30,000 of it.

So, that's that. Now, let's try it again next year—Like hades we should!

THE CHAIN SYSTEM OF FLYING SCHOOLS

(*Continued from page* 61)

training is much more intensive. From the time the students arrive at the camp until they leave, they are positively wrapped up in aviation.

The camp at Martha's Vineyard is ideally situated amid the quaint island surroundings of one of the most fashionable summer resorts of the East. The accommodations for the students and instructors are located at the edge of the flying field, and the students eat with and fraternize with instructors during the entire period of the course. They are closely associated with aircraft during every moment of the day, which enables them to study the problems of aviation.

In addition to ideal flying conditions, the recreational advantages are unsurpassed at this seaside resort. A private bathing beach adjoins the camp, and with its location on the border of the famous summer colony of Edgartown, the students may avail themselves of all the social activities and sports, including yachting, tennis, golf and archery, which help in developing agility, accuracy and self-confidence.

Up in Maine, eight miles from Portland, will be opened the other aviation summer camp. Approximately 120 college students will be trained in three classes of forty each, from June 20 to September 12. Students will live in a large log cabin constructed of cedar and equipped with electric lights, running water and other such conveniences.

Direct control of instruction will be under Capt. Robert D. Coath, manager of the Curtiss-Wright airport at Portland, who will be assisted by six expert instructor pilots and six licensed mechanics. Each instructor will have a group of seven students, and competition between the teams under competent directors is expected to be very keen.

Among the colleges already represented by students enrolled are: Yale, Princeton, Harvard, Williams, Massachusetts Institute of Technology, Lehigh, Brown and Swarthmore. It is also planned to team up students from the various colleges for competitive purposes.

Located in the vacation State of America, this camp lends itself ideally to outdoor relaxation and sports, as well as providing excellent flying conditions. A diversity of recreational attractions, including golf, tennis, swimming, baseball and social functions, will be provided between flying and study periods. The famous Willowdale Golf Course is nearby, and Sebago Lake and Bar Harbor are only a short drive away.

The physical condition of fliers is of primary importance, and special attention is paid to the health of members of summer flying camps. The first thing every morning setting-up exercises are held, and throughout the day the additional sporting activities help build up the physique of the students.

It is possible that some student will be unable to complete his course at one of these camps and will have to leave before the season is over. This particular student, moreover, may find himself next winter miles from Maine, in fact as far south as Florida. Here again the chain system of flying schools shows its advantage. For this student can go to a Curtiss-Wright school in Florida, at Miami, for instance, and there pick up his work where he left it in Maine. This involves no additional expense, and the student will gain by following a uniform system in the completion of his instruction.

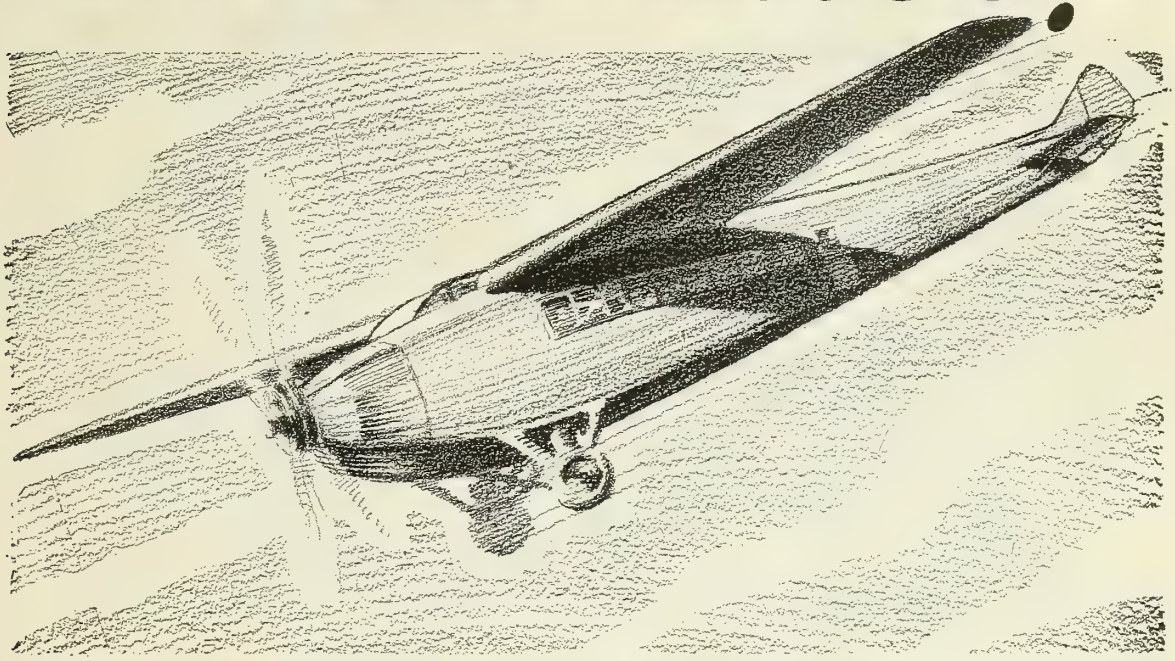
Suppose a student has learned to fly and has received his private license. He wishes, perhaps, to continue toward a commercial license in his home region. The chain system of flying schools gives him every facility for doing so. Though he takes his advance courses at a base many miles from where he trained for his private license, he will still be working under the supervision of the same organization. He will be working under a system already familiar to him and which he has come to trust.

It is the policy of Curtiss-Wright to give extensive training in cross-country work, because this is the type of flying that will be done after the student gets his license. A chain of schools facilitates and encourages cross-country flying. Landing in new fields and flying over unfamiliar territory results in confidence and valuable experience. Merely piloting a ship about an airport, taking off and landing on the same ground does not give the diversity of training which experienced fliers should have.

An example of the extensive cross-country experience given our students is the trip of fourteen planes to Florida from Valley Stream last winter. These planes piloted by advance students made the trip without difficulty of any kind in spite of cold weather and severe winds.

(*Continued on next page*)

Endurance!



...depends largely on structure

IN a product where pre-determined reliability is so important as is the case with tubing for aircraft construction, it is necessary to surround its production with every safeguard for constantly maintaining that reliability; equal integrity of all tubing used, no matter how small the size or how short the piece may be, is, of course, prerequisite to safety in construction. National Tube Company is fully appreciative of this important phase of aircraft building, and both designers and builders may rightfully expect that the long experience, expert knowledge, skillful methods and selected materials used, enable this company to apply the principle of uniform quality to the highest degree in the production of NATIONAL-SHELBY Aircraft Tubing.

Every foot of this product, therefore, must pass through an intensive system of testing and inspection. The tests for both chemical and physical properties are made to conform to U. S. Army Specifications.

NATIONAL-SHELBY Aircraft Tubing is carried in stock by distributors located at convenient points throughout the country. Write for Booklet, "NATIONAL-SHELBY Aircraft Tubing" which furnishes, in compact, handy form, information concerning seamless steel tubing for designers and builders of various types of aircraft.

NATIONAL TUBE COMPANY · Pittsburgh, Pa.
Subsidiary of United States Steel Corporation

NATIONAL-SHELBY AIRCRAFT TUBING

Faultless Vision

with all day flying comfort



THE WILLSON PILOT GOGGLE

IS A UNITED STATES NAVY TYPE

THE wind that forces its way under the padding of ordinary goggles and gives the flier "crying eyes" cannot penetrate the sealed air-tight contact which this channel-shaped, pliable rubber mask creates. Only slight headband tension is required to give this sealed contact, and thus the wearer is relieved from discomfort and any tendency toward sinus trouble caused by undue pressure on sensitive parts of the face from excessive headband tension.

While flying, air is forced through the venturi tube (on top of each cup) which partially exhausts the cup interior and so eliminates lens fogging.

Each lens affords a lateral range of vision of 135° and their surfaces are ground with a precision that permits of no image distortion. This frees the flier from those headaches which usually come from eye-strain during prolonged periods of goggle wearing. These Goggles are priced no higher than many commercial goggles which are not a Navy type. $20.00

The workmanship, appearance, and performance of the Willson Pilot Goggle leave little to be desired.

PRICE

with clear glass $20.00 *per pair*
with tinted glass 23.00 *per pair*

WILLSON PRODUCTS, Inc

READING, PENNSYLVANIA

U. S. A.

(*Continued from preceding page*)

Practical experience obtained by this trip could have been gained in no better way. Students plotted their own courses, did their own navigating and learned how planes are maintained by taking care of the necessary adjustments on their own engines and control systems. They had to make their own decisions and take the proper precautions exactly as if they were commercial pilots employed by some transport airline, with the great responsibility which this implies.

THE VERTICAL DESCENT

(*Continued from page 73*)

cal investigations but unsuitable for clarifying a problem.

Let us assume the air to be perfect; that is, free of friction and compressibility. Let us also assume the propeller blades to be free of any friction drag, commonly called profile drag. We neglect, of course, the mechanical friction of the mechanism.

The argument leading to a drag coefficient ONE is as follows: The air is originally at rest and passes the propeller disc with half the velocity of fall V, that is, with $\frac{1}{2} V$. The air assumes finally twice this value, V, in keeping with a general relation between the initial velocity, inflow velocity and final velocity, requiring that the inflow velocity is the arithmetic mean of the other two velocities. Under these circumstances the mass of air passing the propeller disc per unit time is $\varrho S V / 2$ where ϱ denotes the air density and S the area of the propeller disc, $D^2\pi/4$. The change of momentum per unit mass of air is $T V$, so that the change per unit time of momentum becomes $\frac{1}{2} \varrho S V^2$. This is the thrust, or drag, and divided by $\frac{1}{2} \varrho S V^2$ gives the drag coefficient ONE.

It should be noted that the energy absorbed by the air as kinetic energy is $\frac{1}{2} T V$ per unit time. This is only half of the gravitational energy becoming free, the other half has to be dissipated. This is the weak point of the argument. It must be shown that there exists no other flow absorbing more than half the energy available for the creation of drag. If it does, its drag coefficient will be larger than ONE, and ONE will not be the theoretical maximum.

In order to arrive at such solution, we have to conceive in our mind a picture of a flow different from the one just discussed. The old computation is based on two assumptions: (a) that the transfer of pressure takes place strictly in the propeller plane, and (b) that the mass of the air taking part in the transfer is equal to the product of the propeller disc area and of the inflow velocity. Both assumptions are well fitted for propellers under ordinary conditions, but they seem to be unfit for propellers under extreme loading, as in the present case.

We proceed by considering a flow where the air approaches the propeller so that it is entirely stopped relative to it when it has reached it. The inflow velocity relative to the propeller is zero, but nevertheless there passes an appreciable volume of air. This is possible because the effects of the propeller blades reach beyond the propeller plane, to points well in front and rear of it. The air is not stopped in its motion in all directions, only the component of its motion parallel to the original motion and to the propeller axis is zero. In the vicinity of the propeller the air flows substantially parallel to the propeller disc. The air finally returns in the direction from which it came, the final velocity becoming equal and opposite to the initial velocity.

Relative to the undisturbed air, the initial velocity is then zero. The inflow velocity, or rather its component parallel

(*Continued on next page*)

From Coast to Coast in 14 Hours, 45 Minutes, 32 Seconds



. . . and COLONEL LINDBERGH establishes the newest Transcontinental Record with RICHFIELD

AT EXACTLY eleven minutes, fifty two seconds past 11 P. M. Easter Sunday, a speeding Lockheed Sirius plane powered with a Pratt & Whitney Wasp motor, piloted by Colonel Charles A. Lindbergh with Mrs. Lindbergh acting as co-pilot, appeared over Roosevelt Field, Long Island, circled the field three times, touched the ground in a perfect three-point landing and another Transcontinental record had been made with Richfield.

Colonel Lindbergh, Technical Advisor of the T.A.T.-Maddux Lines, made this flight to test the possibilities of using higher altitudes for air transport.

Lindbergh took off in the early dawn Sunday, his plane carrying 446 gallons of Richfield gasoline in the tanks. He followed the "great circle" route, flying at altitudes ranging from 10,000 to 15,000 feet . . . streaking through the sky at an average speed of more than 175 miles per hour.

Richfield joins with the nation in saluting the "Flying Colonel" and Mrs. Lindbergh. Once again Lindbergh demonstrates the superb courage and flying skill that made possible his history-making flight across the Atlantic.

RICHFIELD AVIATION GASOLINE

RICHFIELD
THE GASOLINE OF POWER

PRECISION PARTS



HARDNESS AND SIZE ARE CHECKED

TO MAKE precise parts that are *accurate* every detail must be carefully checked. The illustration above shows the Rockwell Hardness Tester being used by a Govro-Nelson engineer to determine the hardness of a jig detail. The instrument in the background is a direct reading comparator—accurate to .0001 inch. It enables Govro-Nelson to check roundness with nearly perfect accuracy.
These machines are but a part of the splendid equipment used by Govro-Nelson in the manufacture of precision parts for the aircraft industry.

GOVRO NELSON COMPANY
1931 ANTOINETTE-DETROIT

(*Continued from preceding page*)

to the axis, is equal to the velocity of fall, V, and the final velocity is equal to twice this, to—$2V$. The air flows finally into a jet moving ahead of the falling giro.

The volume of the air taking part in this motion can no longer be computed from the inflow velocity, because the relative inflow velocity is zero. We have to make an estimate for the cross-section of the initial and of the final slipstream. It seems a good guess to assume that both together occupy the entire propeller disc area, half of this cross-section in front of the giro; that is, half of it being occupied by air approaching the propeller and half of it by air being repelled by the propeller and falling down ahead of the giro. This gives the mass $\varrho V S/2$ and the drag equal to the change of the momentum

$$T = \varrho V 2V S/2$$

so that the drag coefficient becomes now TWO, rather than ONE in the classical case. The power absorbed is now equal to the entire gravitational energy available.

The actual flow created by a descending giro will be somewhat different from the described one, but it will probably possess a drag coefficient governed, to a certain extent, by the relation found. The air is unlikely to flow for any great distance ahead of the falling giro; the repelled slipstream will probably soon be dissipated. These things should be investigated experimentally. The present theory is suitable as a basis for new experiments, and they in turn will serve as a new basis for further improvements of the theory.

In the mean time, in the light of the preceding discussion, I remain somewhat skeptical about the reported value of FOUR of the drag coefficient. Until further evidence is collected, my mind is open for values near TWO only, as I myself measured eight years ago. Exact measurements of the down velocity are very difficult to make, and appreciable errors can easily occur. It is also possible that in the cases reported a steady state of motion was not yet reached, and the propeller was supplying energy as a flywheel.

The substitution of the maximum drag coefficient TWO for the old value ONE, until such time when our knowledge has further advanced, is what we intended to contribute at this time to the discussion of the complex problems confronting us in the autogiro. The arguments brought out are not only useful for the deduction of the mathematical constant TWO, but beyond this immediate purpose, they throw a bright light on the mechanism of the creation of lift by freely spinning propellers and on the aerodynamics of an autogiro descending vertically or moving otherwise.

TRAINING THE NAVAL AIR RESERVE

(*Continued from page 76*)

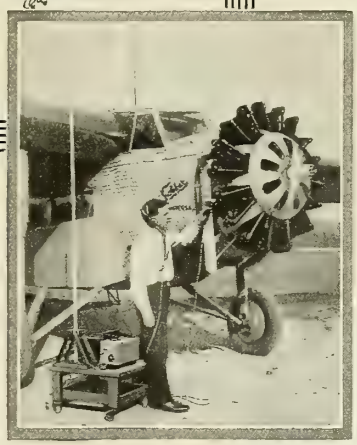
Those who have not had college physics or elementary electricity are required to take this subject which consists of magnetism, magnetic fields, magnetic induction, Ohm's law, electromagnetism, electromagnets, electromagnetic induction. These are essential to a thorough understanding of magnetos.

This thorough technical background is essential in order that the candidate may later take his place as a commissioned officer in the Fleet.

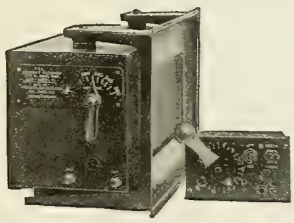
After the candidate completes the ground school course, he is given a competitive examination. From those successful in passing this test are selected the men who are to take the elimination flying course. Those selected must enlist as seamen second class, United States Naval Reserve, or privates in the United States Marine Corps Reserve.

(*Continued on next page*)





Showing A. W. Parkes, Field Engineer of A. R. C., using ignition test receiver to determine adequacy of shielding of ignition system. Note probing antenna held in left hand by means of which an ignition leak can be located to within an inch or two. The complete shielding of the ignition system on an airplane is essential to the perfect performance of the radio receiver. Reception is impossible in the presence of strong local disturbances set up by the spark plugs when unshielded. This A. R. C. field apparatus tests shielding and is capable of locating leaks in the shielding in a few minutes, which might otherwise require days to find by a hit-or-miss search.



Aircraft Radio Corporation is the designer, sales representative and installation agent for all Aircraft Radio equipment manufactured by Stromberg-Carlson Telephone Mfg. Co., and the National Carbon Company, Inc.

Write us for particulars or drop into our airport located three miles north of Boonton, N. J.

To Owners and Operators Interested in *Safe* Flying:

BAD weather during the past year was responsible for the worst accidents in passenger air transport.

It is a direct responsibility of the owners of every airplane in operation to avail themselves of every modern device to insure *safe* arrival of planes.

Good pilots seldom worry with modern airplanes. They know that the chance of failure of engine or plane is too remote. And if such failure does occur they can land safely if visibility is good. But they do worry over the unknown element of uncertain weather ahead.

It is up to you, Mr. Owner and Operator, to remove those doubts. The Department of Commerce and private research have placed the means at your disposal.

Do you know what it means to be flying in low clouds over the mountains with no assurance of what it is like just ahead or how fast it is closing in behind? It may be clear just over the next ridge or it may be impassable.

The assurance that comes through hearing the spoken words of the government announcer at Bellefonte, "Ceiling 3,000 feet, visibility six miles" removes the doubt. The pilot can proceed without taking a chance. Or if that report is adverse he can, through knowing conditions over entire airway, land safely at some other point. And if it becomes necessary he can follow the radio beacon to safety under conditions where his compass is useless.

Ordinarily the beacon is unnecessary to pilots accustomed to the route. But it is there stretching an invisible vertical plane which cannot be blown aside by cross winds in case it is needed.

The weather reports issued by radiophone every half hour are the outstandingly important feature of the service. Their value cannot be over emphasized.

The private airplane owner can save himself time if he has a receiving set in his plane no matter where he is. Before taking off he simply tunes in on the nearest government station. No delay, no long distance unintelligible telephone calls.

Do you know that installation of radio shielding on your engine actually improves engine performance and reliability? Do you know that perfect reception is possible in the air?

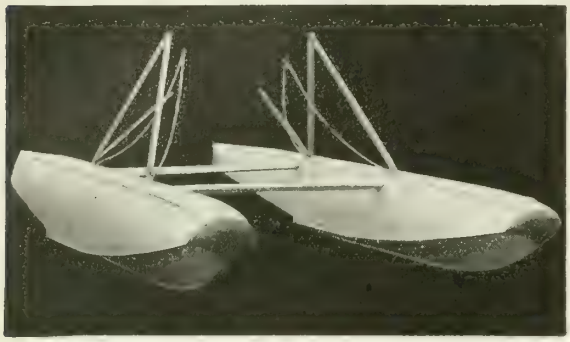
Avoid expensive experiments and mistakes. Aircraft Radio Corporation with Stromberg-Carlson, have developed the finest equipment available in aircraft receivers. Aircraft Radio Corporation has developed spark plug shielding adopted as standard by Pratt & Whitney which has proved itself by tests and in such flights as on the record flight through tropic downpours of Lts. MacMullen and White from N. Y. to Buenos Aires.

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Aircraft Products
CORPORATION
OF AMERICA

(Continued from preceding page)

The qualifications for this enlistment are:

(1) The candidate must be a citizen of the United States or one of its insular possessions.

(2) He must be physically and psychologically qualified for a normal enlistment in the Navy, and further, for actual flight training. The minimum height permitted is sixty-four inches.

(3) He must be in his fourth year at college or a graduate. An equivalent education is acceptable. Previous education should be such as to permit an understanding of the ground school subjects.

(4) At the time of enlistment the applicant must be not under eighteen years of age. He must not be of such an age that he will be over twenty-eight years old when he receives his commission.

(5) He must agree, if so ordered, to remain on one year's active duty after receiving his commission. The total of this time is not to exceed twenty-one months, inclusive of the training period.

Those who meet all of the requirements of the flight elimination course are sent to the nearest Naval Reserve Training Station for a thirty-day period with pay. Here the students receive their first actual flying experience. Consolidated training seaplanes are used for this purpose. Students are given the exact duplicate of the dual instruction course used at Pensacola. The syllabus consists briefly of:

One and a half hours' dual instruction, including two familiarization flights, with oral instruction only.

Five hours' dual flying for preliminary training in taxying, take-offs, climbs, straight flying, turns, glides, and full-stall landings.

Four hours' dual time for instruction in quarter spirals from 250 feet and half spirals from 500 feet to landing. Also emergency landings from all positions relative to wind.

One hour's dual instruction in entry and recovery from spins.

Check with chief flight instructor—a review of the foregoing; a practical test to determine the student's fitness for solo.

If check is O.K.—one and a half hours' solo devoted to practicing above work. Solo flights may be given until student's total time is eighteen and a half hours.

If the student fails to qualify for solo at the end of ten hours' dual instruction, he may be given additional time up to five hours, after which there follows a second check.

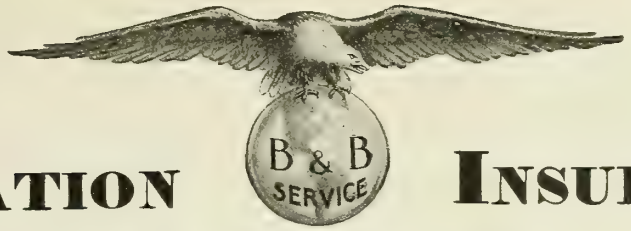
Those who fail to qualify for solo during the course are permitted to terminate their obligations to the Government. Approximately fifty per cent of the candidates finish this phase.

The successful students are ordered to Pensacola to take the complete Navy flight training course which requires about eight months for successful completion. The elimination classes are arranged so that their graduates arrive at Pensacola as a regularly scheduled class.

At this station the students are quartered in barracks. Their meals are served in the mess hall, and in general, they live the life of an enlisted man. They are officially designated as Student Naval Aviation Pilots. Including flight pay, the seamen receive fifty-four dollars a month, and the Marines get forty-five—a difference sufficient to make the Marines wonder why they chose that branch of the service!

The Reserves are given up to ten hours' dual instruction, if necessary. They may, however, take a check for solo

(Continued on next page)



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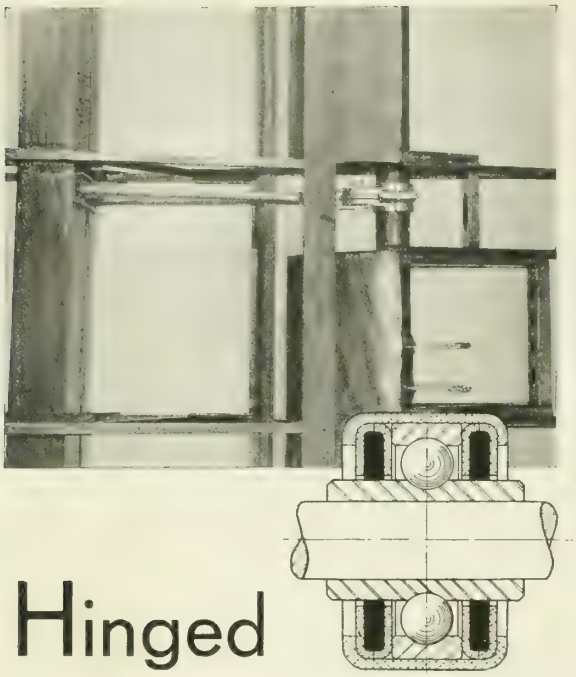
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BALL BEARINGS

FAFNIR MOST COMPLETE LINE OF PRECISION BALL BEARINGS IN U.S.A.

(Continued from preceding page)

any time after five hours. After the training they have just completed, practically all of them should pass the solo check. The seaplane training syllabus, after solo, consists of:

Five hours of solo time devoted to practicing take-offs, full-stall landings, climbs, glides, turns, quarter and half spirals.

One hour of dual flying to check on the above. Power-stall landings are added at this time.

Five hours' solo for practicing all work given to date.

Check—practical test of all work given to date.

One hour of dual time to check on previous work. Add flipper turns, flipper spirals, precision spins (recover on any desired heading).

Five hours of solo to practice above work.

One hour dual to check on all work given to date.

Five hours' solo flying to practice all work given to date.

One hour dual to check on all work to date.

Five hours' solo to practice all work given to date.

Check—practical test on all work to date.

One hour of dual time for instruction in precision landings from 6,000 feet. (At 3,000 feet shut off gas. Dead stick landing within 200 feet of moored boat. Must be a full-stalled landing.)

Three hours' solo time to practice precision landing

Check—for precision landing.

One hour of dual flying for instruction in wingovers and figure-eights.

Two hours of solo to practice above.

One hour of dual flying for second instruction in wingovers and eights.

Three hours' solo to practice the above.

One hour dual flying in preparation for final check.

Three hours of solo time to practice for final check.

Final check.

The instructor who makes the check flight with the student is not the one from whom he has received instruction. If he assigns an unsatisfactory mark for the work, the student is required to take two more checks which he must pass. If he fails to pass them, he is brought before an advisory board. The student's record is studied thoroughly. He may be given more instruction and then required to pass two checks, or he may be dropped from the course—"washed out."

At the final check the student not only should be a comparatively safe flier, but he is expected to be smooth on the controls. He will have a grand total of approximately seventy hours in the air.

He now proceeds to Corry Field for landplane instruction. The course there follows in part the syllabus used for seaplanes. However, it progresses much more rapidly. In addition, stunts, night-flying, formation flying and cross-country work are given. Emergencies and forced landings are drilled into him. In short, he is polished up in all respects.

During this time, the student is flying one-half of the day, and the other half he devotes to ground school work. The latter course parallels closely that received at the various colleges. It is contemplated giving this course only at Pensacola in the future. A great saving of time and money would be involved.

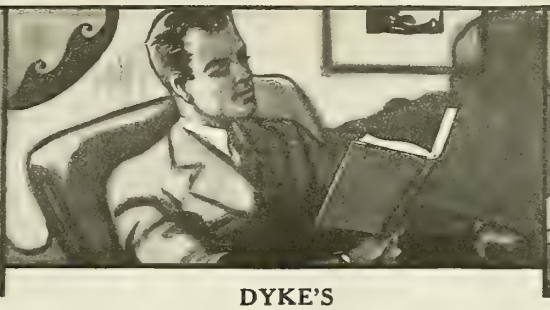
Upon the completion of the primary course at Corry Field, the student begins the advanced work. Here he is given thirty hours in Vought Corsairs. He is taught the application of radio to observation and scouting. This train-

(Continued on next page)

The WILLCOX Practical and Dependable AVIATION BOOKS

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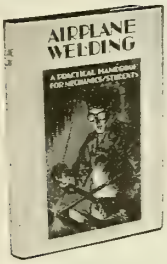




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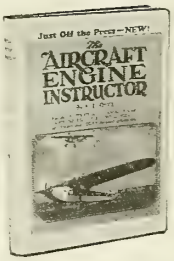
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Author of Dyke's Automobile and Gasoline Engine Encyclopedia—a book favorably known the World Over.

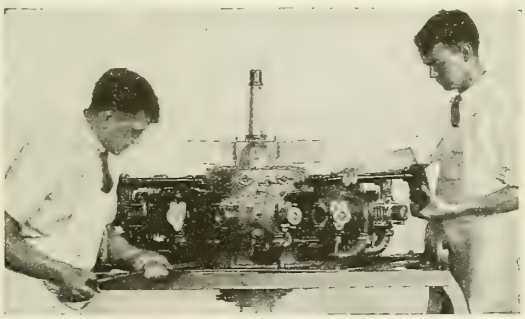
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(*Continued from preceding page*)

ing is followed by twenty hours in Curtiss Hawks, which includes complete training in the maneuvering of fighting planes. Advanced formation work is also given. This completes the flight training, and brings the time of most Reserves up to at least 250 hours.

Approximately seventy-five per cent of those starting the Pensacola course after previous training complete it. Thus, the final successful percentage of those taking the original flight elimination course is about forty per cent.

Orders are now issued for duty in active service squadrons in the Fleet. Very little choice either as to the type of squadron to which he is to go, or its locality, is possible. The Naval Reserve may be assigned to a fighting plane squadron based on a carrier. Or again, he may be ordered to a patrol squadron equipped with two-engined long-distance patrol planes. In any case, the assignment is thrilling and interesting, for it is his first actual duty as a qualified naval aviator. During the year's active service, at least one major cruise will be made by the Fleet. Perhaps to Panama or possibly to Hawaii. The Aircraft Squadrons accompany the Fleet in all its important operations. Naturally, it offers most desirable experience.

The Marine Reserves are sent to Quantico, Virginia, upon the completion of the Pensacola course. Their flying activities are centered around this locality.

Upon the completion of the year's duty, the Reserves are placed upon an inactive status. If they are so fortunate as to live near a Reserve base, they can continue their flying in service planes. Most of them, however, usually engage in some branch of commercial aviation. If the succeeding Reserve class at Pensacola fails to fill all the vacancies in the Fleet, the Reserve who has just completed one year may request a second year's active duty. Reserves are also frequently used on active duty in other jobs. For instance, thirteen of them are now acting as flight instructors at Pensacola.

The year's active duty will add from 200 to 300 more hours of time. This will make a total of approximately 500 hours. A military commission is won. The Reserve has been paid while acquiring his aviation training! These facts, combined with the excellent instruction given and experience gained, present an attractive opportunity for launching an aviation career to the college man—or his equivalent.

BUYING AMERICAN AIRCRAFT

(*Continued from page* 58)

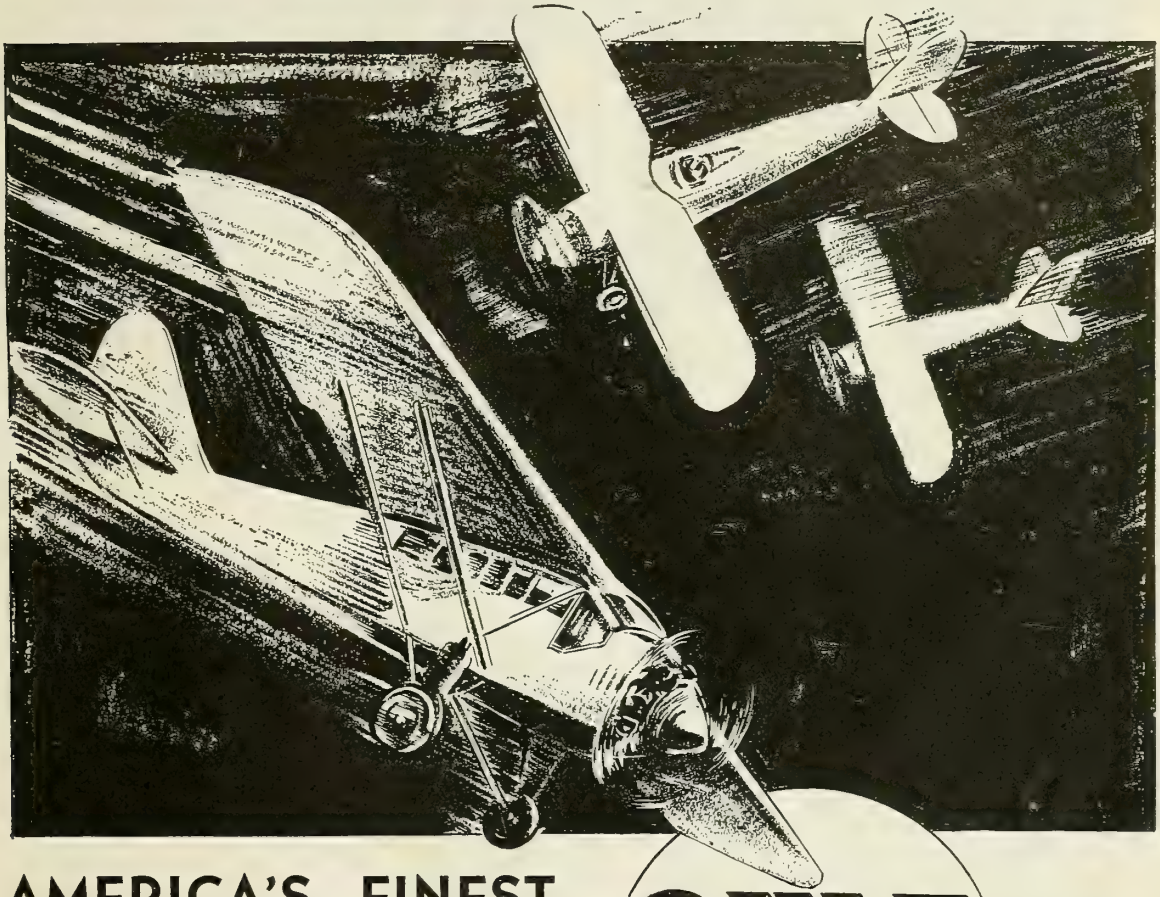
Airworthiness for Export. It is possible to ship the plane out of the country without the latter certificate, but it is very likely that the country of destination has treaty obligations or import regulations which prohibit the entry of such a plane.

The lack of this certificate may, therefore, decide Senor Astrada against the plane. A cable is sent from the Aeronautics Trade Division to the commercial attaché for Senor Astrada pointing out that the Department of Commerce cannot make specific recommendations; that one of the four planes on his list cannot obtain the Certificate of Airworthiness for Export; that the other three are in the same class and type, differing only in details of performance, equipment and price; and that he cannot go wrong by selecting any one of them.

In due course, Senor Astrada makes his decision. Here it may be well to point out the lesson of experience which shows that in such cases an agent or dealer on the spot with a demonstration plane to show and use for rides for Senor

(*Continued on next page*)

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IF you have never seen a pair of Vacuum Grip Pliers you have no idea of the fine workmanship that can be put into a tool of this type. You'll be just as proud to own a pair of Vacuum Grip Pliers—and to show them to your friends—as you would be if you were exhibiting a set of Johannsen Blocks or a micrometer gauge.

The painstaking care expended on these pliers is reflected in higher efficiency in the pliers themselves—and in a noticeable increase of efficiency on the part of the mechanic using them.

Your kit of personal tools will welcome the addition of any one or all three of these special Vacuum Grip patterns:

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(Continued from preceding page)

Astrada and his friends usually gets the business.

Unless the lucky manufacturer is experienced in the export business—which he usually is not—he continues to rely upon the Aeronautics Trade Division of the Department of Commerce for assistance. It is still ready for him.

The manufacturer of the plane purchased by Senor Astrada may have an experienced export organization or at least an export manager. Or, the company may be without experience in the export field. In either event, it is very likely that the firm can make considerable use of another service which the Aeronautics Trade Division has available for him at this stage of his problem.

The Handbook for the Aeronautic Exporter is a loose-leaf service manual compiled by the Division, printed and distributed by the Aeronautical Chamber of Commerce, containing all the available information concerning exporting for every country in the world and maintained in a current condition by the printing and distribution of releases containing new information as it is obtained. It is the purpose of the handbook to point the way to United States manufacturers of airplanes and kindred products toward successful exporting. The handbook, containing all necessary exporting data, the names of prospective importers and dealers of aircraft engines, parts and accessories, memoranda of opportunities for the sale of such equipment, and certain data on market conditions, is made available only to bona fide United States firms (with at least fifty-one per cent of capital controlled by citizens of the United States). The Exporters' Index enrollment, entitling manufacturers or exporting firms to this complete service, may be arranged directly or upon application to the Aeronautics Trade Division through one of the twenty-seven district offices in the United States of the Bureau of Foreign and Domestic Commerce. In the compilation of the handbook, the division has received a very considerable degree of coöperation from the sixty-three foreign offices of the Bureau of Foreign and Domestic Commerce, located in strategic points throughout the world for the specific purpose of aiding American manufacturers to market their products, as well as from consulates of the Department of State. The book attempts to present in readily available form the factors in exporting; basic and current market data are presented which will enable those interested, whether or not experienced in export, to have a complete and accurate picture of the elements, both favorable to and militating against, the importation of U. S. aeronautic equipment.

The exporter of Senor Astrada's plane has enrolled on the Exporters' Index, and this vital information is on his desk. He finds therein all the available details about import duties, insurance, documents, credits, etc. In addition, there are references to special Bureau bulletins for his use, such as that of the Tariffs Division, "Preparing Shipments for Latin America;" another of the Transportation Division, "Packing for Export," and the like.

All these services may help to get Senor Astrada's airplane packed and shipped. With this action, the assistance which the Department of Commerce can render the exporter for this particular shipment comes to an end, save for assistance at "Jovellanos," which the commercial attaché may be able to render when the plane arrives.

It will be seen from this brief description that through these services an overseas buyer and a United States exporter have been brought together, that the foreign buyer has been placed in contact with only the best American

(Continued on next page)



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(*Continued from preceding page*)

firms, and that the airplane which the purchaser receives has, after highly specialized inspection, passed the rigid design, structural and safety requirements of the United States Federal Government.

MEDICAL ASPECTS OF SAFE FLYING

(*Continued from page 72*)

the importance of the flight surgeon. Woolford has said, "periodic physical examinations of the nervous system are imperative to detect early evidences of undue strain in order that an interval of rest may be taken to permit the nervous system to recover its normal tone. Failure to take this precaution simply means that disaster is courted as the nervous state goes from bad to worse and the pilot's judgment becomes so impaired that eventually he is involved in a serious crash."

Periodic physical examination of fliers presents unusual opportunities for the conservation of health. A pilot would hardly fail to give his ship periodic inspections. The human element in flight is quite as subject to deterioration as the mechanical. Periodic physical examinations are becoming recognized as life-prolonging. Life insurance companies are offering free physical examinations to their policy-holders, because they have found that the early detection of defects leads to better chances of cure and a longer life. The same applies to aviation.

Already in the Department of Commerce we have found a number of cases in which the physical condition of the pilots has fallen off considerably in six months. In a few cases the change was so marked as to cause a new flight test to be required. One large transport company has already insituted the procedure of having its pilots checked once a month by a flight surgeon. This does not mean a complete physical examination but a check for "staleness." The results obtained in the Army and Navy from the constant medical supervision of pilots has been so satisfactory and the spirit of coöperation between the pilots and flight surgeons so excellent that I predict the day will come when all large transport companies will have their own flight surgeons to supervise the health of their fliers. One crash prevented may save several lives, and thousands of dollars worth of equipment. It will be a worthwhile investment.

Not only can flight surgeons be trained to make the physical examinations of pilots, but their further knowledge of aviation medicine and flying itself can keep pilots fit to fly and reduce the number of accidents.

Flying is attended by a severe stress and strain on the physical and nervous mechanism. Too much flying day after day, too much dissipation, lack of physical exercise, all contribute to produce a condition known as "air-staleness," or "aero-neurosis." This condition is evidenced by irritability, loss of interest, occupational dreams, insomnia, fear of the air, a falling off in flying ability, and certain physical symptoms. If this condition be detected in its incipiency, the case can be cured. If it is let go till it is severe, recovery is slow and frequently impossible. Here is where the trained flight surgeon is invaluable.

The Army has found that the incidence of so-called "staleness" is approximately thirty-three times as great among Air Corps officers as among officers of the rest of the Army. This fact certainly shows the flying personnel is subject to a stress that does not affect those in non-flying occupations. Transport companies must realize that too much flying decreases the efficiency and lasting abilities of the pilot. Pilots must realize the importance

(*Continued on next page*)

Kittyhawk Specifications:

Engine—Kinner K-5	100 h. p.
Approved Type Certificate No. 166	
Length overall	22 ft. 11 in.
Height overall	8 ft. 8 in.
Span both wings	28 ft.
Chord both wings	4 ft. 6 in.
Wing area	233.4 sq. ft.
Weight empty	1107 lbs.
Useful load	768 lbs.
High speed	110 m. p. h.
Cruising speed	90 m. p. h.
Landing speed	38 m. p. h.
Climb	1200 ft. p. m.

The Kittyhawk is approved by the Department of Commerce both as a land plane and as a sea plane. The landing gear can be easily removed and floats attached.



Some planes are built for speed

But to gain superiority in either speed or stunt performance, a plane must sacrifice safe flying qualities. The Kittyhawk will travel 110 miles per hour . . . it will out-perform most planes in its class . . . but we have not attempted to develop these features at the expense of safe flying.

The Kittyhawk is a light, three-place biplane . . . built for training, commercial and private use. With a landing speed of 38 miles per hour . . . with a wheel tread of 7 ft. 2 in. . . . an inexperienced pilot can get into or out of small rough fields with a greater degree of safety.

Try to spin the Kittyhawk . . . a few skilled pilots have been able to hold it in a spin for three or four turns . . . not more. Certainly, this is a feature of safety which few planes can duplicate.

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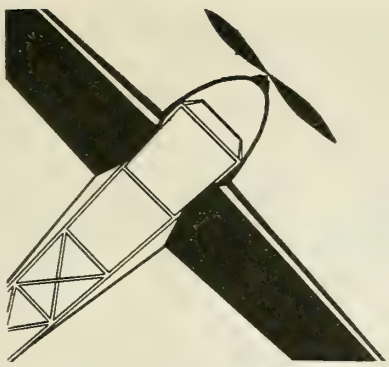
(Continued from preceding page)

of rest and exercise if they expect to keep in flying trim. The pilot must realize that because he receives a physical certificate today is no guarantee that he will be physically fit to fly every day for the next six months. He must learn that minor ailments may be serious in the air, that consulting a flight surgeon is only good insurance and that minor things taken care of now may prevent serious conditions developing later. In the civilian field the efficiency of medical supervision after the original selection depends largely on the coöperation of the industry and the pilots themselves. Sound physical condition is more important in flying than in any other occupation. We now come to some of the more special features of flying in which the medical service may be of help. High altitude flying concerns civilian pilots but little as a rule. It is of deep concern to war-time pilots, for combat work is carried out at very high altitudes. It has been found that not all individuals react equally well to high altitude. If the day ever comes when we have a 100 per cent efficient oxygen apparatus, this fact will be of less significance. At present, however, high flying should be done by those best fitted to withstand it. A classification of pilots should be made, and they should be restricted to the altitudes at which they are most efficient. Here again, the classification is only in the interest of efficiency. I have heard more than one pilot boast as follows: "I took the altitude test and they limited me to 15,000 feet. I went out, got a ship, and climbed to 18,000 feet without difficulty." Naturally, he could. He misunderstood the purpose of the test. The classification means, not that the restricted pilot will drop dead if he crosses the line, but only that he will not do efficient work and that his physical make-up will be under too severe a strain at high altitudes to warrant his flying repeatedly over the limit set for him.

There is one other feature of altitude that should interest those who contemplate trying to break the altitude record. The ordinary person believes that if he takes oxygen the effects of altitudes are nullified, and that is true *up to a certain point.* Beyond that point, however, no person may go and still live even though he is breathing pure oxygen. The reason for this is that man depends for life on a certain pressure of oxygen in his lungs and a certain pressure of carbon dioxide in his tissues. When these are absent, he dies. This critical line is thought to be somewhere between 40,000 and 45,000 feet. Here the pressure is so low that, even though man is breathing pure oxygen, the pressure of that oxygen is too low to sustain life, and in addition the pressure of carbon dioxide in his tissues has been diminished to such an extent that his blood cannot let go of the little oxygen present in his tissues. The effects of oxygen won't come on insidiously. The individual is unaware of his flagging efficiency. Unconsciousness supervenes before he is able to do anything about it. Continued high altitude is fatiguing. The use of oxygen even at moderate altitudes helps ward off fatigue, and above 20,000 feet it is a necessity.

There is one more danger to the flier, and that is high speed. We know too little about it, but we do know that pilots have complained of dizziness and faintness on sharp turns at high speed. We know of one instance in which the flier had hemorrhages into his retinae and probably slight brain injury. Experimental work has shown that speed may cause brain injury sufficient to kill. Straight ahead flying is far less dangerous to the body than making turns at high speed. What the limits will be, I do not believe anyone can say.

(Continued on next page)



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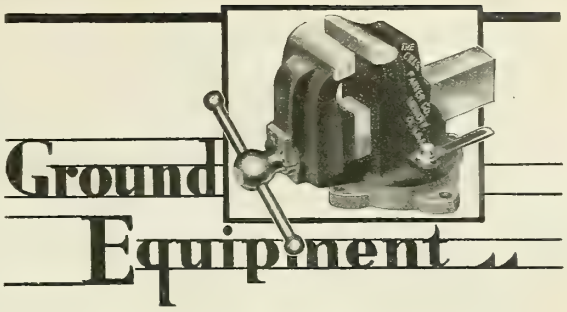
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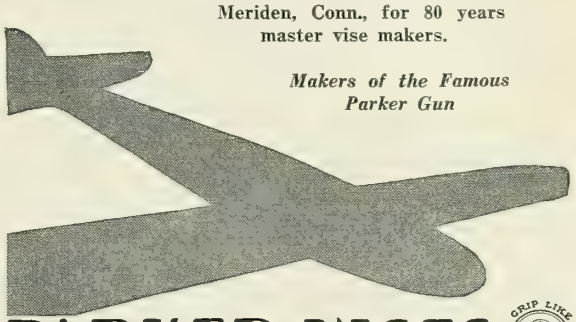
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(*Continued from preceding page*)

When opportunity permits, we shall have more valuable statistics to work up at the Department of Commerce, with over 36,000 original examinations and over 10,000 re-examinations to draw from. We may as a result find we should revise our standards. We have tried making them more lenient than has ever been done elsewhere. Whether or not this has been wise, time will tell. There are many points that need further investigating. Work on color vision and corrected goggles particularly needs to be done. Improvements could doubtless be made on some of our tests. In general, though, I think our physical examination is satisfactory and the results bear this out. We need, particularly, closer coöperation between the civilian flier and the flight surgeon. We need recognition of the importance of aviation medicine by the transport companies, with closer supervision of the health of pilots. We need a more general appreciation of the effects of altitude and high speed, with research work on the latter. We need some means of determining the reaction time of students. Those with slow reaction do not make good fliers. Certain individuals who can pass a satisfactory physical examination never learn to fly for lack of aptitude. It is not purely a medical proposition. It is a matter for coöperation between the doctor and the instructor. The British believe they have solved it in the Reid reaction apparatus. The Army has hopes in the Ruggles Orientator. It is a matter of great importance to aviation and it will need the cooperation of all those concerned to solve the problem.

A FLYING TOUR OF THE PHILIPPINES

(*Continued from page* 57)

and one wing was badly torn.

Weather improving, the two other planes continued the next day to Cebu, those left behind wiring to Manila for spare parts. Safely this time they rounded the bleak northern coast of Negros and headed east across the channel between that sugar island and the island of Cebu. A dangerous passage, for pontooned planes, across the narrow, twenty-five-mile isthmus of land in northern Cebu. Once past, is a scenically perfect flight down the coast to the city of Cebu, second in size in the island.

The men rested for only an hour here and about noon took wing again, this time for Lake Lanao, in Mindanao.

When they had flown to the end of Cebu and could glimpse Mindanao, another rainstorm, more violent than that on the preceding day, closed in on them. As they proceeded over the inland sea, they lost sight of both Cebu and Mindanao. The storm made visibility so low the water could be seen only at a few hundred feet. A second change was decided upon, and abandoning the direct route to Lanao, they headed instead for Misamis.

Another difficulty this time arose, that of making out the coast and avoiding collision with the steep mountains ahead. Flying within a few hundred feet of the jagged bluffs, they came above Misamis, a small town, mostly of nipa huts, at the head of the spear-like bay that pierces northern Mindanao.

Descent of the two planes on Misamis out of a storm, the first time the inhabitants had seen a plane, created a sensation. The entire town swarmed out to greet them, and a battle ensued to keep the native "bancas" off the ships. The constabulary mobilized in time to prevent damage, and the aviators were guests of the governor that night.

Taking off again next day and climbing to 5,000 feet, the planes crossed the mountains, with their luxuriant jungles and Nyanza-like waterfalls, to rest on Lake Lanao.

(*Continued on next page*)

28,000 FEET UP*

...in formation!

* [This international record was made at Mather Field, April 12]

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Air Corps Photo showing Wasp-powered Boeing P-12B fighters in record flight.

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MODEL 204—6-PLACE FLYING BOAT, 425 h. p. Wasp. High speed, 133 m. p. h. 15-second take-off, 913 pounds payload.

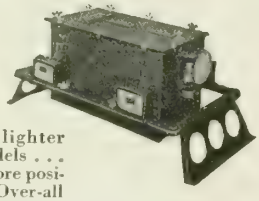
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		No. Price	No. Price	No. Price	No. Price	No. Price
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FRAME	CURVED		FLAT		DESCRIPTION
	No.	Price	No.	Price	
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Comet *	178	[illegible]	78	6.50	Drop Eye Shape

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(*Continued from preceding page*)

where the hoodoo again descended. For two days a heavy fog blanketed the region.

On the third day the fliers got into their planes at dawn, finally to see the fog bank roll away, but in taking off a new difficulty arose. Because of the rarefied atmosphere, at 3,000 feet, and because the water of the mountain lake was perfectly smooth, the planes had great difficulty in getting off. Twice the planes sought to rise, going several miles in the penguin-like attempt. Finally instead of going abreast, one plane preceded the other and in this way, the second plane took to the air. The other had to dump some of its fuel before getting off.

Because of the delay, the fliers, originally planning to follow the north coast of Mindanao to Zamboanga, instead, after soaring to 5,000 feet, cut across the narrow part of Mindanao to the south, flying over the cottas (forts) of the Moros, scene of much fighting between Spanish and Moros and later between Americans and these fierce Mohammedans—over, too, the steep Lanao pass—to the head of Malangas Bay. Once planes sent from Zamboanga by the Navy dropped bombs near these forts as a demonstration. Airplanes may yet be used in warfare against rebellious Moros to better advantage.

If Manila is the "Pearl of the Orient," the smaller Zamboanga deserves an even higher rating in the nomenclature of precious stones. It is the artist's, the dreamer's, the magazine illustrator's version of a South Sea Island resort. It is the American capital of Sululand.

A curving white coral beach, white concrete piers to which are moored vessels bound to and from China, Australia and Borneo, a row of government buildings hidden among trees at the water's edge, and an expanse of green cocoanut groves on the alluvial plain that bites into the mountains behind—this is Zamboanga.

The planes found a safe anchorage here just off the large house once occupied by the military governor. The trip from here to Jolo, ninety miles, was a little more than an hour filled with the delights of passing hundreds of islets, like a necklace of pearls, to the large round island made famous as the home of the Sultan of Sulu and the scene of many a battle.

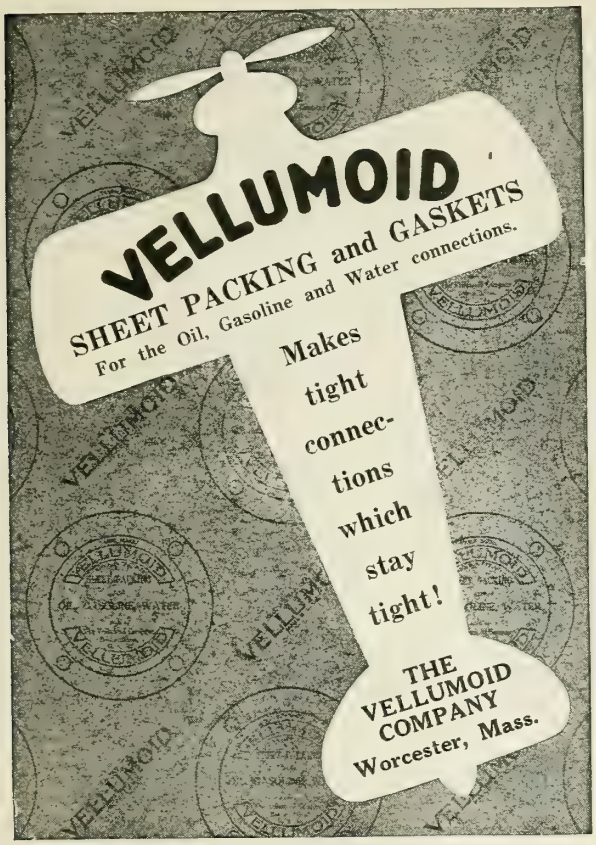
From Jolo, only a few degrees from the equator, flying at 3,000 feet, one can see the dark coast of Borneo, a continent by itself, to the southwest. When the two planes returned to Zamboanga after a day's outing, including tea with the Governor and a chat with the Sultan, they found the third plane settled at anchorage. It had repaired the damage suffered in the night wreck off Negros and although five days behind the others had caught up by omitting Lake Lanao.

From Zamboanga back to Manila, the planes flew along northern Mindanao to Surigao, whence they made two long jumps, using Tacloban as the mid-way point, to Corregidor. Two other mishaps added to the misfortunes.

In landing at Surigao, one of the planes hit a piece of bamboo floating on the water, which punctured the pontoon. The fliers, without proper tools, worked the better part of a night to repair it. The huge seaplane had to be beached for this "operation" with improvised tackle and ways.

The other misadventure led to the loss of one of the squadron. The plane, in circling about for a landing at Misamis, was caught by downward current of air and crashed into a cocoanut grove. A few seconds later the plane went up in flames, but the fliers crawled to safety before the tank blew up.

(*Continued on next page*)



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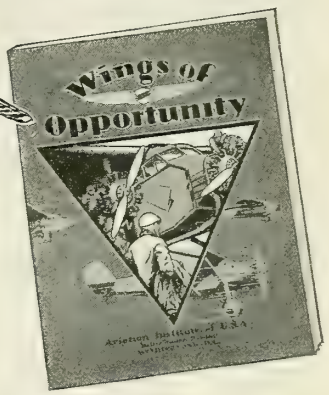
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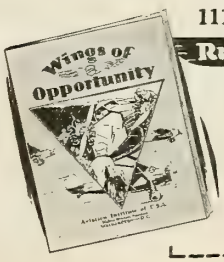
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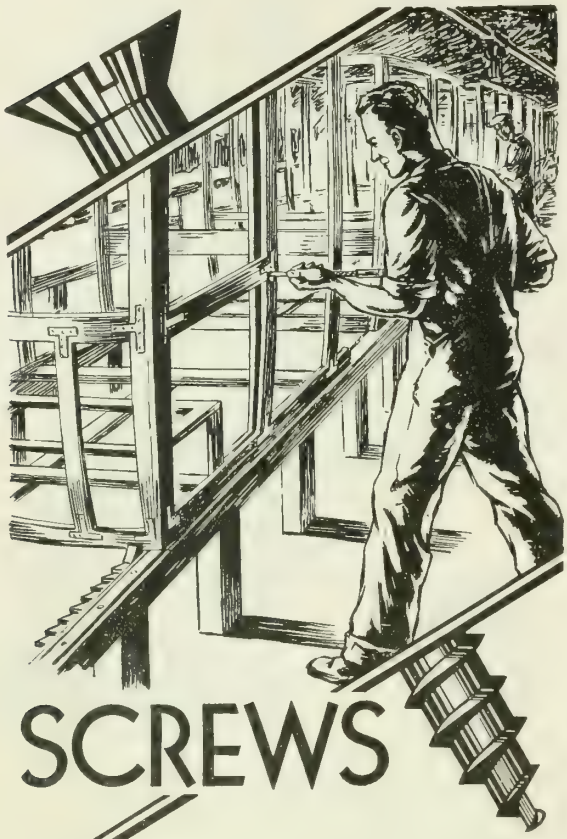
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(Continued from preceding page)

The two remaining planes flew into Manila Bay with mail from the south, just fourteen days after leaving, and only two behind schedule. That trip was one of a regular service. A company has been formed to start a commercial airline between Manila and Cebu, with plans to cover other points as well, but aerial communication is mainly dependent upon the Army and Navy. It will not be long, however, before civilian fliers, more than a score of whom own planes in the Philippines, undertake an airline to rival those in operation elsewhere in the Orient.

These flights about the Islands, covering up to 1929 every square mile of territory in the Philippines, have had more than their immediate local effect by pointing the way to possible Manila-San Francisco flights and other major enterprises in the Pacific.

Considering the work going forward since 1919, when the first plane appeared in Manila, judging from the economic and strategic gain in these ten years by planes, it seems probable that if American penetration as a whole has not been successful in the Philippines, this is one way in which the United States is developing an omnipresent guardianship over its Oriental protectorate, is learning more about the island, geographically and otherwise, than the Spanish occupants, with antiquated methods, gained in centuries.

Colonization by air!

That may be the new trend of our century.

For their courteous assistance in gathering material for this article, acknowledgment is made to Major C. J. Browne, Air Officer, Philippines Department; Major Clinton W. Howard, commanding officer, Camp Nichols; Captain Audrey I. Eagle, and other officers of the United States Army Air Corps on duty in the Philippines at this time.

WEST INDIES AERIAL EXPRESS

(Continued from page 68)

winds, when blowing at all, are invariably from the eastern quarter in the afternoons. Five miles an hour is a good average, so we take the best approach and set her down.

After greeting our good friend Ralph de Rose, airport engineer de luxe and Issoudun cadet, we pass on to that genial and rotund field manager, Paul Behr, who all but wiped out the flying circus single-handed during the recent disturbance along the Western Front. Then comes the one and only dangerous part of the entire trip. It consists of riding to the hotel Venus (there's nothing in a name) behind the cock-eyed-est chauffeur in all Cuba. He figures that so long as he toots his horn, and he does it momentarily, that he is thereby entirely absolved from murder and manslaughter so far as the lowly pedestrian is concerned. The same goes for on-coming trolleys and automobiles. Maybe it's the heat that gets them that way. At any rate, all chauffeurs down there are strictly goofy.

On the way to the hotel, we bet centavos whether or not the water will be hot in the showers; and dollars that there won't be any water at all, hot or cold.

The good Señor Perez meets us at the door smiling broadly. He likes all air pilots and has really done more for aviation in Cuba than almost any individual of whom I know. He's a real booster. Invariably he asks for his good friends "Meester Doonten" and "Rowe" who pioneered the old West Indies Express some years ago and helped it to grow into a real airline as it exists today.

After a shower, if any, we sit down to one of the best dinners in Cuba. The flying personnel for the two divisions

(Continued on next page)



Announcement

The demand for the Aeronca C-2 has exceeded our most optimistic expectations. Actual orders have made it necessary to increase production to a point where it will probably exceed that of any other plane being manufactured today.

In keeping with our policy of pioneering the huge mass market . . . of building a plane which the average man can fly safely *and buy easily* . . . we take great pleasure in announcing that the Aeronca C-2 has been reduced from $1880 to $1495, Fly-away Cincinnati.

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At St. Louis, during the International Exposition, the Aeronca startled the industry by literally jumping off the concrete ramps after running seventy-five feet or less. Nearly a hundred different pilots took their first hop in it . . . and came down grinning with enthusiasm. The Aeronca's inherent stability, its rapid climb, its easy maneuverability, its eleven to one gliding angle and its 30 mile an hour landing speed had them sold . . . and then some. And when they witnessed that economy run . . . one hour and seventeen minutes on two gallons . . . the Aeronca was proclaimed the sensation of the show.

The news spread rapidly! At Detroit . . . during the All-American Show . . . those who had heard the good word, wanted to be shown. And, after seeing loops, spins and rolls, sideward flying, deliberate stalls at hedge-hopping altitudes and dead-stick gliding demonstrations . . . all with the same plane—an Aeronca C-2—they began to buy.

Then, Stanley C. Huffman established a new light plane distance record by flying from Cincinnati to Roosevelt Field with the 30 h. p. motor consuming less than $9.00 worth of fuel—in spite of head winds.

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(*Continued from preceding page*)

of the line meet there three nights a week. All sit at the one table and between bites indulge in the "old Spanish custom" of swapping rumors.

"Early to bed" is the rule, for at six a.m. crews are up and at the all-day flight back to that "Garden spot of eternal youth and sunshine, where icy winter spends a glorious summer along the coral tinted shores of a turquoise sea" . . . where the gayly colored fish-hawk zooms up . . . up . . . and up . . . until he reaches sea level, whereupon sighting his prey in the billowy foam below, he executes a perfect half roll, followed by a vertical dive, and comes to the surface with a beautiful young Salt Miracle in his beak, amid the cheers of the vast throng of Isaac Waltons out there in the Gulf Stream, who haven't had so much as a nibble all day.

He adjusts his horizontal stabilizer to the added cabin load and takes off for home and the kiddies, with the Salt Miracle doing everything in his power to cross controls on him and put him in a spin. But that's another story.

CAUSES AND PREVENTION OF SPINS

(*Continued from page 78*)

at high angle of attack vary less than plus or minus five per cent of the median C_N values shown.

The variation in sections covers so wide a field as to be entirely representative. The R.A.F.15 is a typical example of the older sections with a medium value of C_L. In fact, it was considered one of the best. The Göttingen 387 is much newer and of considerably higher lift. Note here, however, that the increase in C_N at the lower angles has not resulted in a corresponding increase at angles greater than 27 degrees. In fact, the two curves are less than five per cent of the C_N values apart. Now, neglecting the gyroscopic action of the propeller, which in a left spin helps to produce tail heaviness and vice versa, and to return to our previous case—the variation of angle of attack along the span would put the outer faster wing tip in the region below 27 degrees and the inner above. Then with the higher C_N values below 27 degrees there would be a tendency for the ship to rotate into the spin, since the lift on this side would turn the ship as shown in Figure 5, this lift having two components (vertical and horizontal). The vertical component A-R would tend to roll the ship towards the axis of the spin as shown; the other component A-C acting horizontally would tend to rotate the ship toward the axis, the two reaching an equilibrium at some point depending upon the characteristics of the ship being investigated. As the angle of attack becomes greater, there is a corresponding change in these values. A-B becoming larger and A-C smaller, so that a ship that is becoming more flat in its spinning, is also tending to roll into the spin. At this time the inner wing, because of its lower C_N, begins to sink and the ship starts to side slip towards the center of rotation, setting up a moment that results in a steeper glide and a lower angle of attack, thereby resuming the conditions that existed in the beginning.

(*To be concluded in the July issue*)

THE SEASON FOR CONTEMPLATION

(*Continued from page 74*)

earth. But when General Mitchell is done with you, you will have learned that Europe has aerial transportation while America has only aerial mileage.

There's literally nothing on this side of the Atlantic to compare with the airway system which links the capital cities of Europe. We fall short on every count, except that of daily mileage over scheduled airways, where the mail planes give us a lead. We don't have the airports, the clock-

(*Continued on next page*)

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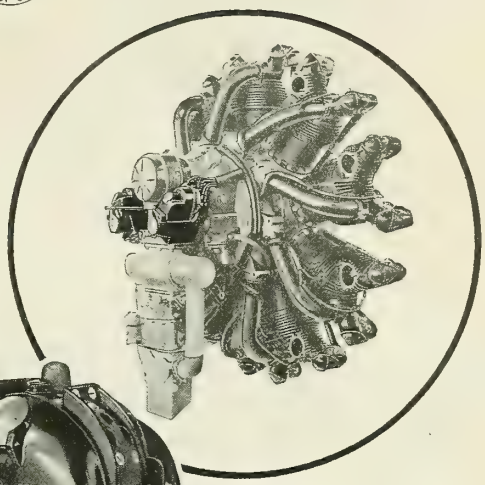
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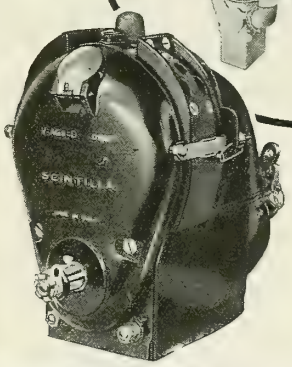
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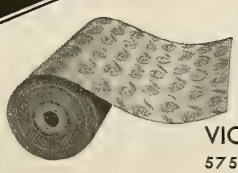
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CHAMPION

SPARK PLUGS

TOLEDO, OHIO WINDSOR, ONTARIO

(*Continued from preceding page*)

work system of regulating traffic, the meteorological or radio systems or the actual business that the Europeans have. And we shouldn't kid ourselves about it.

I know, just as you know, that Europe has all these things because of governmental subsidies, which are as generous as the taxpayers allow. I know that American business doesn't publicly like the idea of subsidies, though I seem to remember that railroads once took everything that the Government would give them and asked for more. I also notice that it is considered quite good form to talk of subsidizing a merchant marine by granting constructive loans and guaranteeing a chunk of profitable business to ship builders and operators. I hear talk of rebates which keep whole industries alive, and I know that nobody really rides on the New York subway for a nickle but that the big city pays the handsome difference between the cost of the ride and the toll of the turnstile. But I also remember that three or four years ago, when aerial transportation was beginning to be taken seriously, it was considered bad taste and slightly treasonable even to mention the word "subsidy" in connection with American aviation.

I'm beginning to wonder why. Somebody pays the piper for every new tune. Somebody puts capital into every new business, until it can walk alone. What we failed to realize at the beginning of this game is that transportation in these days is always on a national scale and calls for capital beyond the imagination of individual investors. The nearest parallel to aerial transportation is, of course, automobile traffic. Who paid the automobile's way into universal use and popularity? Not the manufacturers of cars and trucks, nor the garage men, nor the gasoline companies. The public paid the bill. The public bought and built roads everywhere, and keeps on building them and maintaining them at a staggering cost which the taxpayer carries as cheerfully as he carries any of the costs of his government. If it were not for the long miles of concrete, the millions of miles of hard-surfaced roads, the traffic control systems, and all the bridges, tunnels and viaducts throughout this nation, there certainly wouldn't be a car on the road for every twenty feet of modern highway in the country. You bet there wouldn't.

I don't know how far the Government should go in supporting aviation. Nobody knows. But it is certain on the face of it that most of the arguments against government subsidy for aviation which were good five years ago have gone bad in the meantime. It was said then that government aid encouraged waste and inefficiency. It hasn't worked out that way in Germany and France and England. It was said that private initiative would move farther and faster than an industry supported by public money. It didn't work out that way. It was said that a subsidized aviation industry would become too burdensome to be tolerated by the taxpayer. But the taxpayers of Europe carry on; they give generously over and above their taxes for great aeronautical experiments; they take pride in their air services and pay cheerfully to maintain and improve them.

Maybe we were shortsighted in refusing to take the short cut of government aid in establishing aerial transportation. Maybe we overlooked the fact that public money spent for peaceful projects goes back into the public pocket, and on the way creates new business, new employment, new opportunities for private energy and capital. But we can't overlook the fact today that Europe is far ahead of us in air transport. That's something to contemplate, while the season for contemplation is on.

(*Continued on next page*)

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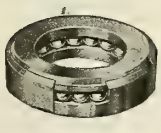
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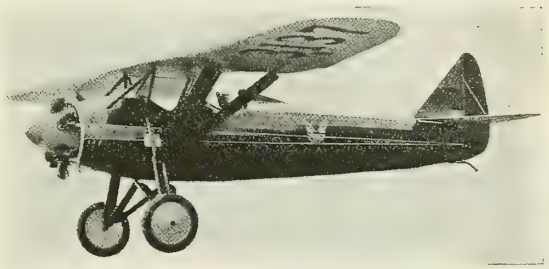
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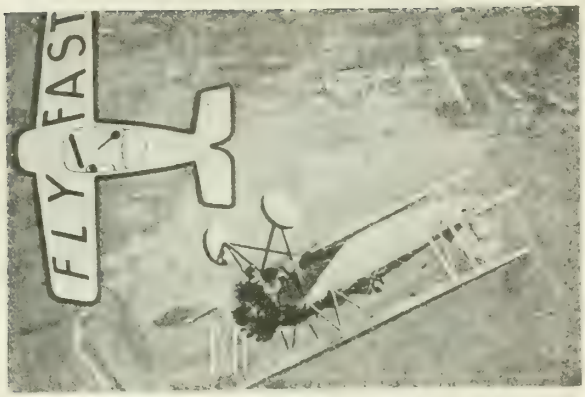
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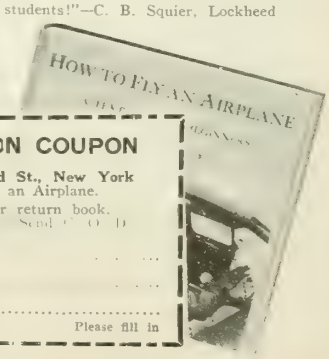
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(Continued from preceding page)

Back of the suspicion of subsidies there was, of course, something else than a philosophy of business. There was recognition of the fact that Europe was supporting its commercial aviation with something more than peaceful intentions. Everything that flies is a potential weapon of war, and no European nation would willingly play second fiddle in the air to its neighbors. And since we have always maintained and insisted that we are a peaceful nation, we would not admit ten years ago that it might be well to pay generously for a fleet of peace in case we should need it in war.

That argument doesn't look so good, either, at this end of our aeronautical experience. For a peaceful nation, we spend an astonishing amount of our small change on arms and armaments. We go to a disarmament conference and come home to spend $900,000,000 for the sake of a peaceful parity at sea. We spend nearly seventy cents out of every dollar of our taxes for the sake of wars, past and to come. We maintain the world's most expensive navy, which isn't a particle of good to us until it moves out to sea to shoot and be shot at. We *subsidize* that fleet, if you please, to the tune of 100 per cent. And yet we shy at the thought of building, maintaining or even assisting an aerial fleet which would be useful in every day of peace and essential in every hour of war. There's no logic in such reasoning.

General Mitchell contemplates very soberly and seriously in his book our war weakness in the air. He is no alarmist, but he looks the facts in the eye. We haven't an air fleet, nor the men to fly it. We might have one, for a fraction of the cost of our surface fleet, and we could use a lot of it in our daily business. To get it would mean spending the public's money, but that's nothing unusual. We are already spending it, and have little to show for it but motion pictures of the Pacific fleet passing through the Panama Canal to the Atlantic or vice versa. That's something to contemplate, too.

But spare a little of your contemplation for the Navy, in this year of grace and international disarmament. The London Conference is over, and was—so they say—a success. What sort of a success?

Well, we should remember that this was a disarmament conference. The average American citizen, having been entertained throughout the performance with stories of the charming young lady secretaries who went along, and with legends of Senator Dave Reed's high silk hat, supposes that disarmament means a cut in the high cost of navies. But it turns out that it really means building more ships until ours is the biggest navy in the world, or as big as the biggest. That's the first surprise.

The second is that nobody seems to know how long is a yardstick. After all the cutting and fitting was over, the naval experts solemnly announced that it would be impossible to tell whether one fleet was stronger than another until they had a chance to argue the question in battle on the high seas. Just for example, there is the entertaining puzzle of the six-inch and eight-inch guns. Offhand one would say that a cruiser with eight-inch guns is considerably stronger than a cruiser with six-inch guns. But wait a minute. It's not so simple as it seems. For at the last moment some naval expert had an overdue brainstorm, and discovered that a six-inch gun can be loaded by manpower and fired three or maybe four times as fast as an eight-inch gun, which must be loaded by machinery. At eight-inch range, a cruiser with that sized guns can shoot the six-inch cruiser out of the water, provided it can see it and hit it. But if the six-inch cruiser gets a little near-

(Continued on next page)

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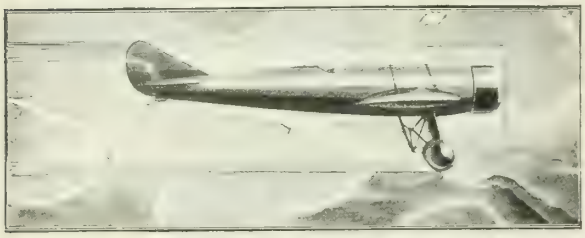
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(*Continued from preceding page*)

er, it can shoot so much faster and oftener that the big boy is likely to be out of luck. So when all is said and done, nobody knows whether a six-inch gun is better than an eight-inch gun or t'other way round, and nobody will ever find out until they shoot each other to pieces in proving it.

That's just a sample of the navy game as played across the board of a conference table. When it's all over we know nothing, except that the Navy wants more ships and the armament factories get more fat contracts. And meanwhile, nobody mentions a fundamental difference between England's naval strength and our own, England being the neighbor with whom we talk loudest of peace and friendship and compete most vigorously in naval strength. Nobody mentions the fact that England has two fleets, one a deep-sea-going fleet of floating fortresses and the other an aerial fleet which guards the island shores and the sea for 500 miles around them. Nobody knows for certain the strength of that flying fleet, but the Englishman sleeps sounder at night because of it.

I commend to your attention General Mitchell's quiet contemplation of the facts in the case. Particularly study what he says of England's experience with divided control over her air forces, and how completely and finally she repented of it in favor of a unified system of aerial defenses. These Europeans are no fools; they move slowly but they learn quickly and when they are once on their way they don't allow either their business or their military policies to be slowly strangled by local politics. They intend no harm to us; we are known the world over to be too big and mean to be monkeyed with. But we live in the same sort of world that they do, and it shrinks rapidly in these days so that our splendid isolation is fast becoming a memory.

If all this contemplation grows too grim and serious a business, we can find relief at home. There came into the news not long ago a story to the effect that certain gentlemen of the Army want a dirigible. They want it to be a bigger and better dirigible, so somebody had made a bill of it and laid it on the doorstep at Washington. It provides for an armor-plated airship, a mile and a half—more or less—in length, and carrying machine guns and bombs and airplanes and everything else you can imagine. All the headline writers crowed happily when they heard about it, and started writing fairy stories about the "flying fort," the "greatest aerial weapon in the world," and so forth. The thing even got its picture in the papers.

Well, what can you expect, with our whole aerial problem at the mercy of inter-service politics and jealousy? The Navy is going to get a couple of dirigibles, so the Army must have a dirigible too. Nothing in its advance publicity indicated what the Army would do with it, when and if it were ever built under Act of Congress. All that was certain in the story was that it would cost about $5,000,000 of the taxpayers' money.

Well, it's a good season for contemplating the mess we are in for lack of a unified aerial policy, both for peace and war. It's not altogether a cheerful prospect, but we ought to face it. If we honestly believe in aviation, we ought soon to begin to prove it on a national scale. We have done a swell job in piece-meal, but we can't go much farther in that fashion. If aviation is the coming mode of transportation, we should hitch up our belt and breeches and make it so. If aviation is the first line of national defense at our frontiers, we should be sure that our flying fleet is adequate and airworthy. Our commercial and military air program is dangerously near to a stall. Let's get out of it, before we get hurt.



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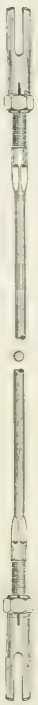
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THE FLEET'S IN—ALL IN

(*Continued from page* 63)

days of Pompeii it was noon, which I maintain is the proper hour for a gentleman to issue forth to do battle with an early-rising world. By that time the business associate, or enemy, has worn himself out on others and is easy meat for the newly-risen crusader in the modern, or Caldwellian, era of business, which is founded on the grand principle, *"Pleasure Before Business—and After."*

But we were speaking of the fleet, which seems to be nobody's business, or it wouldn't go along as it does. It's supposed to be of benefit to the nation, I'm told, but so far as I can see its greatest use is as an anaesthetic to girls with a biologic urge. I don't know what we'd do with it in a war, I'm sure. Of course, I know what we did with it in the last war. We parked it up with the British in Scapa Flow and told it to stay there until the war was over, so it wouldn't be sunk. It did just that, and it didn't get sunk. It didn't fire anything at anyone, either, but that's a detail the Navy doesn't like you to mention. The great point they stress is that they got through a war without sinking. That in itself is considered a naval victory. It's lucky nobody came out to sink them, because they were afraid of getting sunk themselves. You recall the English and the Germans did have one set-to, and both sank an equal proportion of each other and each claimed a victory, after which neither tried it again. Each realized that the proper place for a fleet was in port. The girls on both sides agreed with the Admiralty, so everyone was satisfied.

Well, I wandered out to Riverside Drive—I live just off it, on Ninety-second Street—and there in the Hudson River, right in front of me, was the *Texas,* named after the State where a mob recently slow-baked a live negro and then dragged his body behind an automobile. The *Texas,* itself a relic of the past, is well named after a State whose citizens indulge in such antics of barbarism. You will note no battleship is named *New York?* It's going to get so eventually that no modern State will allow a battleship to be named after it. Some of the less backward States will stand for cruisers, but the really modern ones will want aircraft carriers or nothing. Probably they'll get nothing. Little Rhode Island wanted a boat named after it, so they christened a captain's gig. And Maine and Kansas only rate a coast guard rum-chaser. A slow one, at that.

Well sir, there was the fleet parked in the Hudson. The more expensive boats, the battleships, were anchored opposite Riverside Drive, where they could be inspected daily by the more prosperous element among the New Yorkers. The cheaper boats, such as cruisers and destroyers, were parked opposite the cheaper parts of New York, where the less prosperous, or Anglo-Saxon, species of Americano could inspect them. The cheaper boats were quite good enough for the average American. In fact up about Yonkers, all they rated were a couple of worn-out destroyers and supply ships needing paint.

I was just admiring this fleet, while I heard various complimentary remarks from citizens as to how well we were defended, when from out of the murk down the river more than a hundred planes—I read next day that there were 134—suddeny hove into sight. There was no warning, no time to dodge to cover, no time to get anti-aircraft guns into action with hope of hitting anything. One

(*Continued on next page*)



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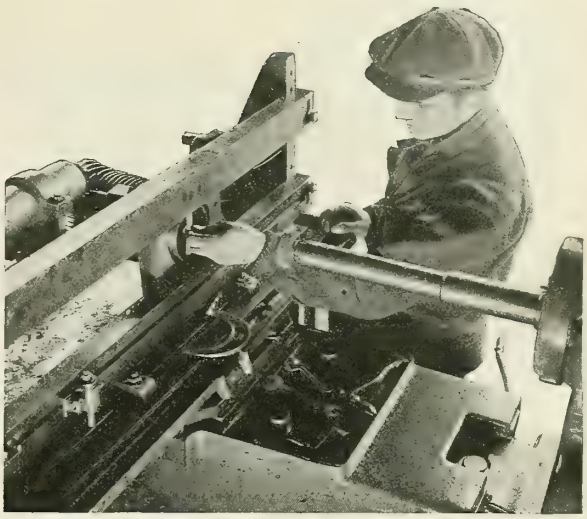
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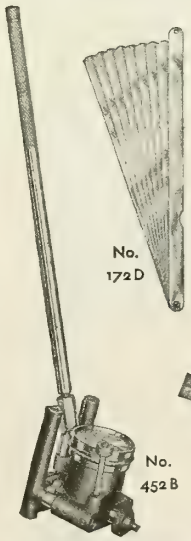
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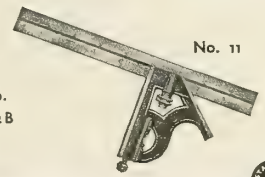
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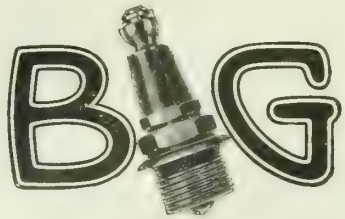


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(Continued from preceding page)

moment I was looking at the Battle Fleet, and the next moment that tremendous fleet of airplanes was droning overhead.

I wish that everyone who thinks a city can be defended successfully against air attack could have seen that magnificent demonstration of air power by the fighting and bombing planes of the United States Navy. If they had been enemy planes, nothing could have saved New York from terrible destruction—not even ten times as great a fleet of airplanes on home defense. There, by the way, is a problem for the advocate of aircraft. One thousand airplanes cannot keep even a small minority of a fleet of one hundred airplanes from bombing a city. Such, at least, is my opinion. And I have no solution to offer. The thousand planes will win the air battle over the hundred, of course. But meanwhile the hundred, or a large part of them, will have completed their mission of destruction. The home defending forces should win, by superior numbers, but how can they win until after a large proportion of the attackers have completed their work? I don't see how.

This attack I saw was too swift to combat successfully, even with other aircraft. One minute the hazy sky is empty and peaceful; a minute later it is filled with airplanes. Torpedo and bombing planes led the attack. Vought Corsairs followed close after them, dropping hypothetical light bombs. I was very glad the bombs were hypothetical. High above them swift Boeing fighters swept in squadrons, searching for defending fleets that were non-existent.

If that had been war, if those planes of the Navy had been enemy planes, in ten minutes the city of New York would have been a shambles. Tall skyscrapers would have been hit, perhaps to topple into the streets, at least to shed their covers of stone onto the crowds of people below. Water mains would have been blown up, rendering the fire department ineffective. Hundreds of fires would have been started. Large bombs would have made craters in the streets, tearing up the roads, caving in the subways, rendering flight for New York's millions impossible. The scenes of panic would have transcended any that have been witnessed before in the history of warfare. The bombings of London during the war by a few ineffective airships gives no more than an indication of what such a scene would be today.

There would be gas, of course. There would be a million people gasping for breath, rushing blindly here and there, falling down to die. The cries of the wounded, the dying, the horribly mutilated, would add to the panic. And there would be no escape. For with the roads impassable, with electric plants put out of commission, rendering subway and surface electric lines inoperative, how could one leave? One large bomb on the tracks of the New York Central or the Pennsylvania, and those roads would be stopped for the time being. A bridge or two over the Harlem River blown up, or one over the North River, and the people of New York would be bottled up in their little crowded island. It would take days to evacuate them, perhaps weeks to repair the damage wrought in half an hour. And there would be succeeding attacks.

As the squadrons of planes circled and dived overhead I looked out and up the Hudson at the battleships. What were they doing? The same thing they did all through the Great War—NOTHING. They weren't expected to, of course. They were not to fire on their own planes. But what could they have done had those been enemy planes? The answer still is the same—NOTHING. Practically

(Continued on next page)

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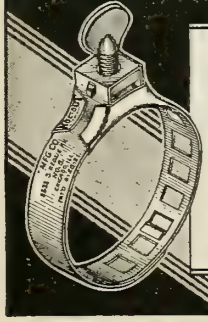
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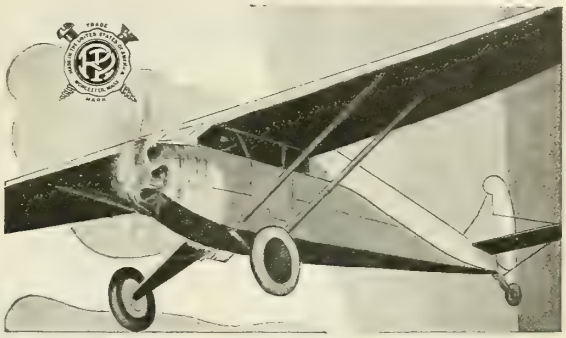
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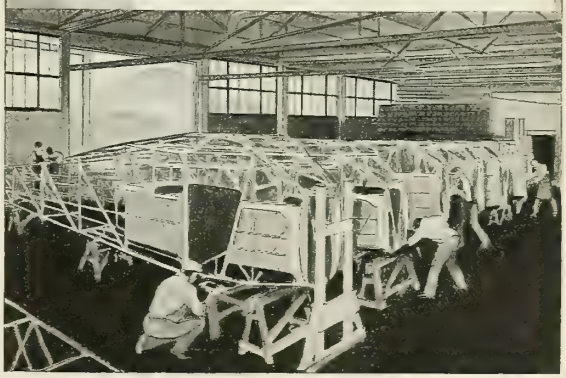


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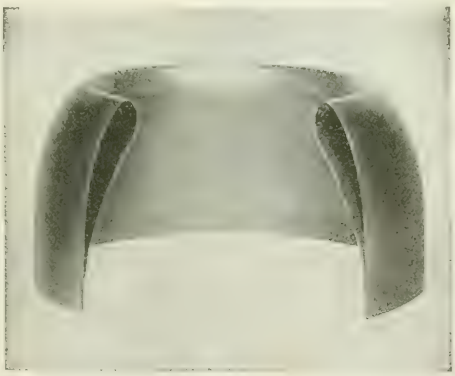

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(*Continued from preceding page*)

nothing. They could have catapulted their few Corsairs; they could have fired their anti-aircraft guns. But the effect would have been precisely the effect of a few planes and a few guns. It would have been the effect of a few planes sent, say, from Mitchel Field, and anti-aircraft batteries mounted about the city. The battleship, as a battleship, would have been utterly powerless to defend New York. It would, in fact, have been merely another target, and a stationary target at that. If the fleet had been caught in the Hudson, it would have been destroyed. In truth, had a war been in progress, the fleet would not have been there, unless the admiral suddenly went crazy. So we may say that so far as the defense of New York from air attack in time of war is concerned, the battleship is utterly and entirely ineffective.

HOWEVER, when I attack the battleship I feel that I am kicking a corpse. I believe firmly that these hulking, slow vessels are dead so far as effective modern warfare is concerned. I have given my opinions in other articles in AERO DIGEST and need not repeat them in detail. But I stress the point that at last even the diplomats and naval authorities apparently are agreeing with me—if the London Naval Building Treaty is any indication. One billion dollars is to be spent to attain parity—and it is to be spent mainly on cruisers. If the British Admiralty decided on canoes and fire-crackers, our Navy would be clamoring for canoes and fire-crackers, too.

New York fell without a blow to this mass attack. Her surrender was practically complete except for minor outbreaks among scattered couples of girls here and there. Even these were quelled by dusk when the gobs from the fleet were allowed ashore. It is good we were captured by our own Navy, so a blonde was telling me.

But next day we were treated to an even finer demonstration of what airplanes can do. One hundred and thirty-one planes took off from Long Island and raided the New England coast, an impossible feat to accomplish in a battleship, handicapped as it is by a low ceiling and a poor gliding angle —to the bottom. The combined bombing and scouting squadrons passed over the Sound and the Connecticut shore.

At Bridgeport the scouts advanced, followed by the bombers. Over the main streets of the city they flew, theoretically destroying the town and the airport. Then they speeded over New London, Norwich and Providence, each of which they "destroyed." They then attacked Boston, and I hope they "destroyed" the Watch and Ward Society. Great excitement was caused in Boston, where the Cabots talk only to Lodges, and the Lodges talk only to God. A Cabot was observed, in the heat of the battle, asking a mere newsboy where the nearest and deepest cellar was. The effect of this was disastrous on Boston's morale.

The fleet proceeded to Lowell and "blew up" a few cotton mills, much to the amusement of Elliott White Springs, who has a sheet mill in Fort Mill, S. C. He's chief sheet tester there. Lawrence was also "bombed," which I suspect was just as well. The entire demonstration proved how easily airplanes could cover 500 miles and destroy or seriously cripple a great manufacturing area.

And all this, mark you, was done, not by what the public thinks of as the Navy, but by that comparatively small part of it that is under the capable direction of Rear Admiral William A. Moffett. To him and to David I. Ingalls, Assistant Secretary of the Navy for Aeronautics, goes a large

(*Continued on next page*)

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CLIP AND MAIL TO-DAY

(*Continued from preceding page*)

share of the credit, and also to Secretary Adams. The trouble is, and it is a big trouble, the flying part of the fleet should be doubled. One hundred and forty-four planes from the Aircraft Squadrons, Battle Fleet, are not enough.

Here is a little problem in national defense that I thought up:

Just imagine that a foreign power came to me and asked me to suggest a plan whereby I could render the entire city of New York untenable within twenty-four hours. I must drive every living person out of New York; I must stop the subways, the street cars, the automobiles, the fire departments, the railroad trains; I must make it impossible for a liner to enter New York and discharge its cargo or take any aboard; I must render every dock untenable, render every building unfit for human habitation, drive every living soul from the city. And I must not kill a single person. How could I do it?

I believe I could drive everyone out, and without injuring a soul. New York is somewhat peculiar in respect to its water supply which is contained in several dams far back in the hills, the largest of which are the Croton and the Ashokan. Allowing that in time of war an enemy fleet, or a number of tramp steamers with airplanes aboard and capable of catapulting them, could come within bombing range of New York—and I see no reason why they couldn't—it is perfectly reasonable to suppose that out of a hundred planes despatched against New York at least fifty per cent would reach their destination. And their destination would be those great dams, towering high above the valley below and holding in their millions of gallons of water.

Is it impossible to suppose that many of those bombs would find their mark and wreck the dams? To me, it is impossible to suppose otherwise. A dam is a huge mark, the planes could fly low, they could not miss. One bomb, properly placed, could make a breach in the dam. The rushing flood of water would do the rest. New York's water supply would be gone—and without a single person in the City of New York having been bombed. The country people below the dams, of course, would be drowned.

Now, how can a city exist without water—and you can't rebuild dams or collect a new supply of water in a day or a month. New York would be dry—for the first time in its career. What the Anti-Saloon League can't do, one or two bombs could do easily. With no water for drinking, for industrial purposes, for sanitation, the City of New York would be a dead city—and dead in less than one day.

Without water the great steam-driven electric plants would stop; the subways and trains and street-cars would stop; the fire departments would cease to function; for though they are not on the same water circuit, they draw the hydrant water from the river by steam-driven pumps—and it takes clean water to run boilers to make steam to operate pumps. And the sanitary system—where is it without water? How long would it take New York, in warm weather especially, to become a reeking mass of filth and disease?

New York as a city, New York as a port, would be utterly inoperative. No man could live in it. The city would have to be deserted.

I don't believe the United States Navy, the defender of New York, has an adequate answer to that problem. Certainly the answer is not contained in a $40,000,000 battleship lying at anchor in the Hudson while the merry gobs make life more lively for the dear little girls about town.

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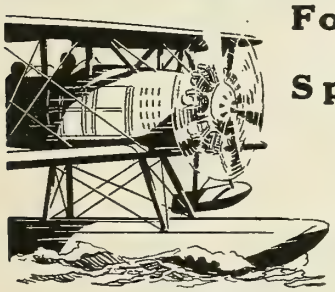
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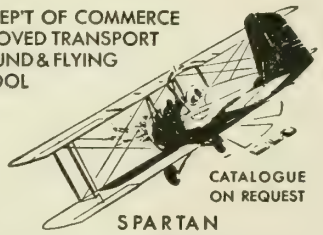
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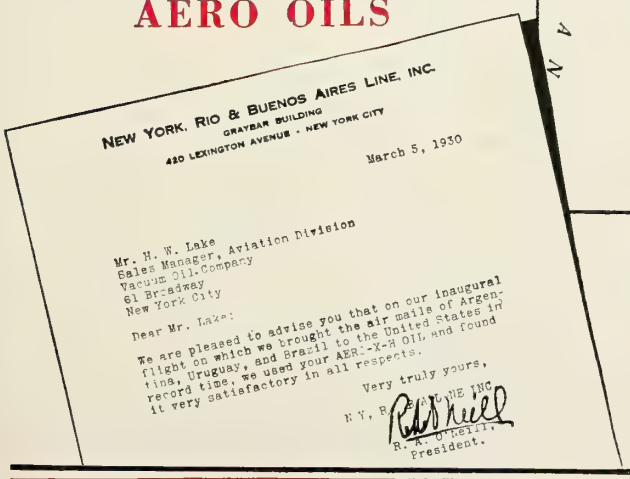
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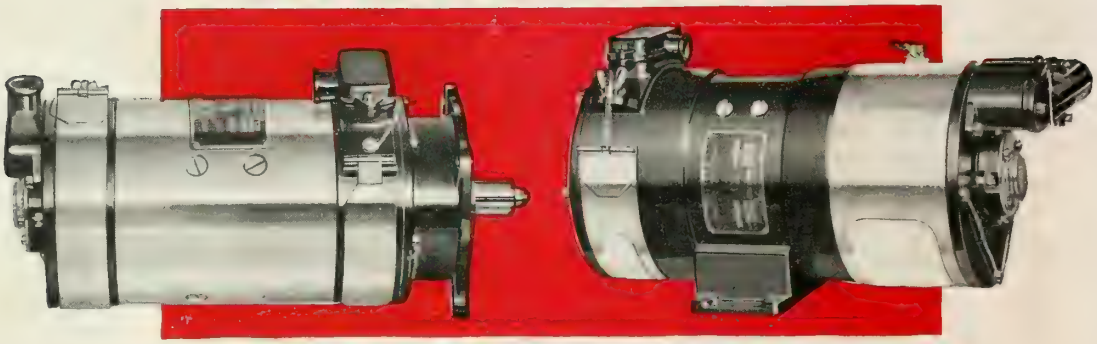
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Lieutenant Apollo Soucek, U. S. N., and the "Wasp" powered Wright Apache in which he established a new world's altitude record of 43,166 feet. Photos courtesy of U. S. Navy Recruiting Bureau, N. Y.

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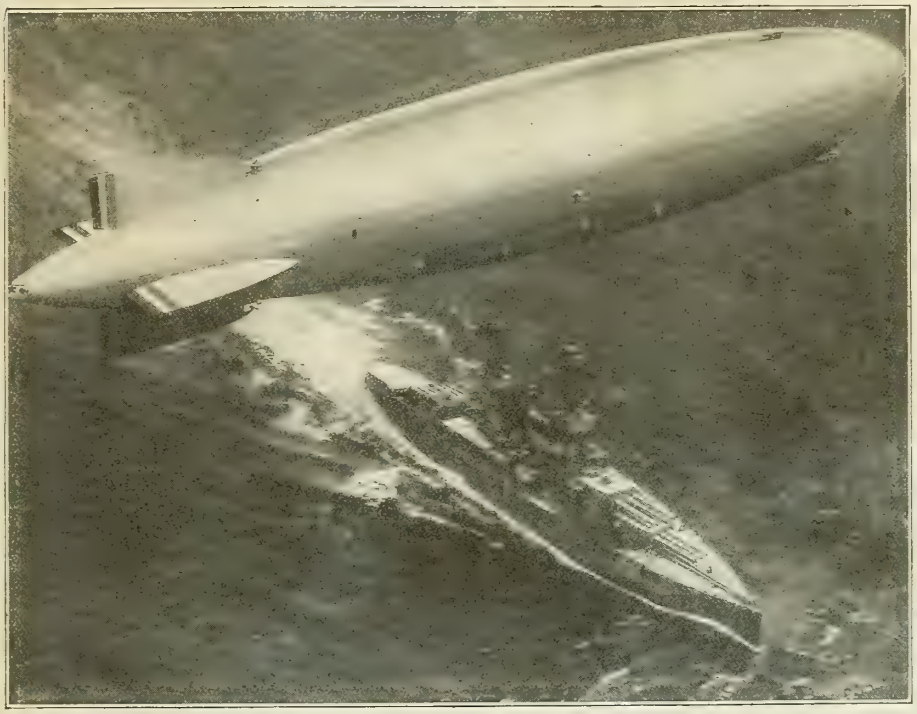
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Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec; in Continental Europe by Bavarian Motor Works, Munich; in Japan by Nakajima Aircraft Works, Tokyo

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SITKA SPRUCE

Plays An Important Part in the Construction of

The U.S.S. AKRON ZRS-4

SITKA SPRUCE furnished by The Yoho & Hooker Lumber Company has been chosen for important construction uses in the world's largest dirigible, the U. S. S. AKRON, Z R S-4 now being built by The Goodyear Zeppelin Corporation. Sitka Spruce meets the exacting U. S. Navy specifications and its strength and texture make it a favorite wood in aircraft building. We are prepared to make immediate shipment in carloads or small express orders from our vast stock.

PLYWOOD

Mahogany, Birch, Bass, Cedar, Spruce etc.

1/40″ 1/32″ 1/24″ 3/64″ 1/16″

GLIDER—VERITHIN—CO-VE-CO

1/40″ 3 ply. Weight 8½ lbs. per 100 sq. ft.

WOODS FOR EVERY AIRCRAFT PURPOSE

Balsa, Mahogany, Birch, Hickory, Ash, Bass, Walnut, Cedar, Poplar, Maple.

Write for Complete Catalog and Price List

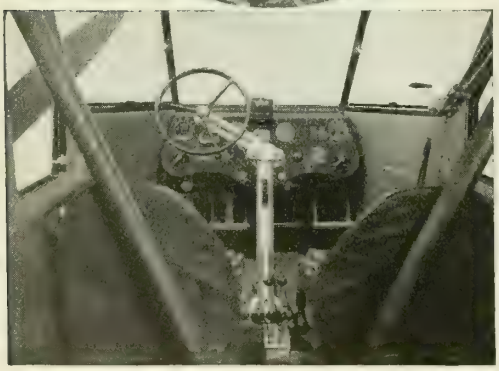
YOHO & HOOKER LUMBER CO.

Carrying the Largest Stock of Aircraft Woods in the World

244 WING BUILDING - - - - YOUNGSTOWN, OHIO

The twin-engined KINGBIRD climbs and flys with *and carries*





Interior of pilots' compartment. Note the unobstructed vision, efficient arrangement of controls, and completeness of instrument board



The cabin is roomy and well-ventilated. Notice the deeply upholstered reclining chairs and appointments — the last word in comfort

MUCH has been said and written concerning the ability of multi-motored planes to climb on the take-off, fully loaded, with one engine cut out. Curtiss-Wright announces its readiness to demonstrate to the satisfaction of any operator or pilot that the new twin-motored 8-place Kingbird *can be relied upon* to accomplish this feat.

The Actual Demonstration

During a nation-wide tour, this test was undertaken at a number of airports. At Milwaukee, on May 14th, the Kingbird, carrying eight people and full gas tanks, was taken off and when less than fifty feet in the air, by previous arrangement but without warning to the pilot, the co-pilot suddenly shut off one engine. The plane continued to climb steadily and was then maneuvered to the right and left in a manner to demonstrate fully its air worthiness with only one of its engines functioning. As the tour continued, similar demonstrations were given at other airports. Many well known test pilots were afforded an opportunity to satisfy themselves that the Kingbird performs on one engine and is therefore outstanding as a safe multi-motored plane.

Why the Kingbird Is Safe

The single engine performance of the Kingbird is possible because the engines are so far forward and so close together that the center of thrust moves laterally only to a negligible degree when one engine is cut out. This fact, coupled with the absolute rudder control developed, eliminates the tendency of the plane to lurch to one side when an engine is cut out and therefore it handles like a single-engined plane.

Last Word in Comfort

The 8-place Kingbird was designed for transport lines and business firms. Its ultra-safety is but one

ONE ENGINE
a "spare" for safety!



of many features. For travel in this plane is as swift, comfortable and economical as it is safe. The wide cabin windows of non-shatterable glass permit passenger visibility that is unsurpassed. The deeply cushioned, reclining chairs are arranged in two rows with aisle between. Lavatory and toilet are installed at rear of cabin. The pilot's vision is unobstructed and dual control is provided.

Top Performance—Low Cost

As the operating cost per mile of the Kingbird is only one-half that of 12 to 14 passenger planes, two Kingbirds can be employed to do the work of one of the larger planes with obvious advantages. Flying them as sections, it is possible to take full advantage of peak loads. Yet, singly they will make loads of five to seven passengers pay profits. Due to rugged construction, maintenance costs of the Kingbird are low. Powered with two Wright Whirlwinds of 240 h.p. each, the Kingbird has a high speed of 135 m.p.h., cruises at 115 m.p.h. Its range is 450 miles, service ceiling 15,500 feet.



Write for Detailed Information

Further detailed information and a demonstration to interested parties will be furnished on application. Write Dept. B-70, Sales Division, Curtiss-Wright Corp., 27 West 57th St., New York.

CURTISS-WRIGHT
CORPORATION

To the Colleges of *and the* Sportsman Pilot . .





VERVILLE AIRPLANES, due to the outstanding workmanship and refinement of detail and finish, are favorites everywhere. You will be justly proud to own a Verville —for aircraft bearing the name of this world-famed designer is unquestionably the finest, most dependable that money can buy.



the Air . . . Verville Presents another MASTERPIECE



Verville has produced this new airplane to meet the demand of flying schools for better training planes, and, to fill the requirements of the Sportsman Pilot whose zest for flying is satisfied only in a highly maneuverable, ruggedly constructed open cockpit plane. This new Verville sport trainer is the culmination of fifteen years' experience in the design of military and commercial aircraft of all types. It is designed and built with Verville thoroughness to army and navy specifications throughout. Graceful and smart in appearance . . . it is the most beautiful, most completely equipped airplane of its class . . . in short, it is indeed a masterpiece embodying every desirable feature and characteristic known to modern science. Write for further information and arrange for a demonstration.

THE VERVILLE SPORT TRAINER

APPROVED TYPE CERTIFICATE 323

Weight Empty 1562 Lbs.—Gross Weight 2240 Lbs.

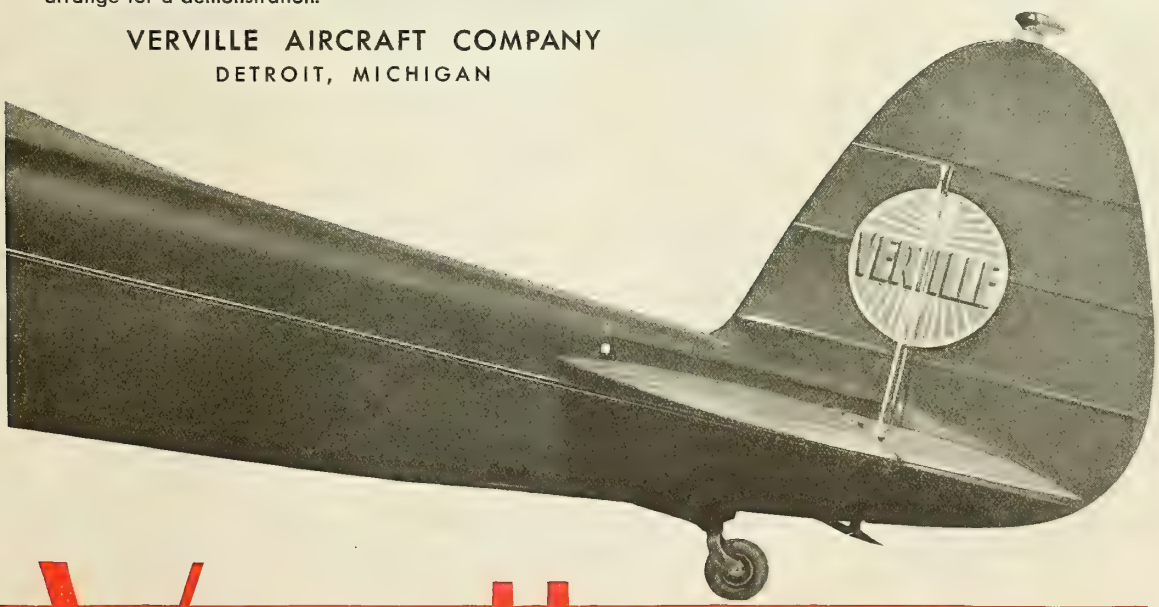
PERFORMANCE
With Maximum Load

High Speed	115 m.p.h.
Cruising Speed	95 m.p.h.
Rate of Climb	900 ft. p.m.
Service Ceiling	15,000 ft.
Landing Speed	40 m.p.h.
Cruising Range	4 hours

STANDARD EQUIPMENT

Continental Engine 165 H. P.
Standard Steel Propeller
Heywood Air Starter
A. P. C. Balloon Wheels with Dual Brakes
Oildraulic Shock Absorbers
Full Castor Tail Wheel with Oildraulic Shock Absorber
Dual Stick Control
Parachute Seats
Three Piece Safety Glass Windshield
Gasoline Gage
Air Speed Indicator
Compass
Two Tachometers
Two Altimeters
Two Oil Pressure Gages
Two Oil Temperature Gages
Dual Throttle
Dual Ignition Switches
Dual Stabilizer Adjustment
Navigation Lights (Dry Battery)
Fire Extinguisher
Baggage Compartment
Tool Compartment, Tools & Kit

VERVILLE AIRCRAFT COMPANY
DETROIT, MICHIGAN



Verville
FINER AIRCRAFT



Now! Lower New



THE FIVE PLACE PASSENGER PLANE $7,990

Approved Type Certificate 224

Increased production on the New Standard Five-Place plane, has brought about this price reduction. It's still the same plane, every item as good as ever, but appreciably lower in cost.

As a money earner, this plane has no equal in its class. It seats four passengers, hops out of small fields, is safe, dependable and extremely well equipped. It has the famous safety fuselage, built of riveted open-section Duralumin.

Standard equipment includes: complete set of Pioneer Instruments, Eclipse Starter, Bendix Brakes, Oildraulic landing gear struts, navigation lights, steerable tail skid and a complete set of covers.

You must see this plane before you choose a new one. Write or wire for a demonstration.

Specifications and Performance

FIVE-PLACE, D-25a

Length Overall	26' 10"
Height	10' 2"
Span, Upper Wing	45'
Lower Wing	32' 6"
Dihedral, Upper Wing	2 Degrees
Lower Wing	4 Degrees
Stagger	34"
Gap	72"
Chord, Upper Wing—70" Average (Tapered)	
Lower Wing—50" Average (Tapered)	
Wing Area including Aileron	350 Sq. Ft.
Aileron Area	26 Sq. Ft.
Stabilizer and Elevators	43 Sq. Ft.
Fin and Rudder	14.2 Sq. Ft.
Load Per Square Foot	9.72 Pounds
Landing Gear Tread	8 Ft.
High Speed (Full Load)	110 M.P.H.
Cruising Speed (Full Load)	95 M.P.H.
Landing Speed (Full Load)	37 M.P.H.
Climb at Sea Level, (Full Load)	750 Ft. per Min.
Service Ceiling (Full Load)	18,000 Ft.
Cruising Radius (Full Load)	430 Miles
Normal Fuel Consumption at Cruising Speed (Full Load)	12.7 Gal. per Hr.
Weight Empty	2010 Lbs.
Disposable Load	1390 Lbs.
Pay Load	810 Lbs.
Gross Weight	3400 Lbs.
Take Off (Full Load)	8 Seconds
Load per Horsepower	15.4 Lbs.
Powered with a Wright Whirlwind 225 hp. Motor.	

New Standard Airplanes are sold direct to purchasers.

New Standard

Prices On *Standard* Planes



$3,131 THE KINNER POWERED TRAINER

Approved Type Certificate 216

Here again, the economies of increased production have enabled us to reduce prices materially on this plane of proven design and acknowledged performance.

The New Standard Trainer, built to Navy specifications, is the leading trainer of its class. It is rugged enough for outside loops, safe enough for primary work and maneuverable enough for any kind of training.

Equipped with Pioneer instruments and all necessary equipment, ruggedly built with fuselage of riveted open-section Duralumin and wings of government specification spruce, it is the ideal training plane.

See this plane at your earliest opportunity. Write or wire for a demonstration.

Specifications and Performance

TRAINER, D-29a

Span	30 Ft.
Length	24 Ft. 7½ Ins.
Tread of Landing Gear	6 Ft.
Chord of Wings (Upper and Lower)	54"
Wing Area (including Ailerons)	245 Sq. Ft.
Aileron Area	21.5 Sq. Ft.
Stabilizer and Elevators	33 Sq. Ft.
Fin and Rudder	13.5 Sq. Ft.
Load per Square Foot	7.3 Sq. Ft.
Load per Horsepower	17.9 per hp.
Weight empty	1175 lbs.
Disposal load	615 lbs.
Gross weight	1790 lbs.
High speed (Full load)	98 m.p.h.
Cruising speed (1650 r.p.m.)	75 m.p.h
Landing speed	38 m.p.h.
Rate of climb	500 ft. per min.
Service ceiling	11,000 Ft.
Take-off time (Full load)	8 Seconds
Take-off distance (Full load)	245 ft.

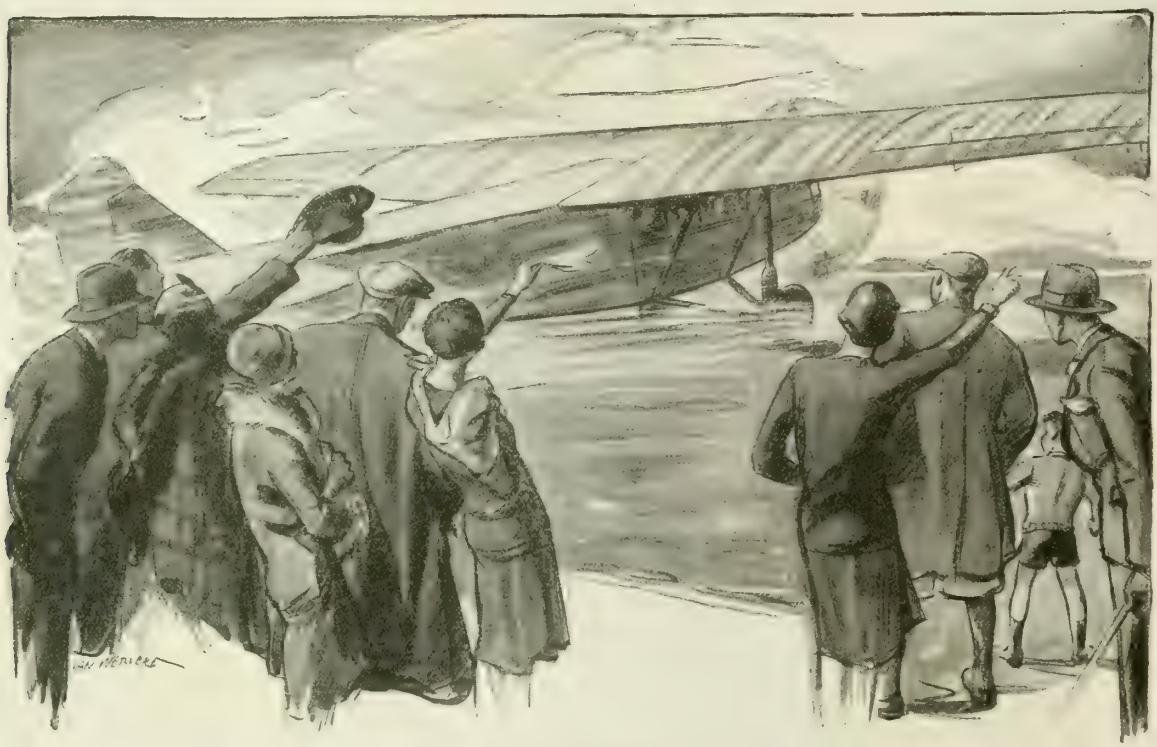
▼ ▼ ▼

Duralumin Fuselage.
Pioneer Instruments.
Oildraulic landing gear struts.
Clear vision gasoline gauge of our own design. Perfect for student training.
Kinner 100 hp. motor.

All prices on New Standard Airplanes are net, f. a. f. Pine Brook Airport, N. J.

Aircraft Corp.

Paterson, N. J.



AIR-MINDED AMERICA

THINGS that contribute to the safety of flying add most to its popularity. -TP- Oils add to the safety of flying. When the public thoroughly knows the story of -TP- Aero Motor Lubricating Oil, people will fly with greater confidence knowing that -TP- is in the engine.

-TP- Oils are new—the latest development in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded, produced from pure, paraffine-base crude by a process for which patents are pending.

This process has marked advantages over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold test.

In terms of performance this means uniform viscosity at all working temperatures, minimum carbon deposit and ignition trouble from fouled spark plugs, easy cold priming, immediate oil pressure, perfect lubrication winter and summer, on the ground or at high altitudes—a maximum of safe flying hours.

A handsome, practical *Pilot's Log Book* sent free on request.

-TP- Aero Valve Spring Lubricant



Also -TP- Aero Rocker Arm Lubricant

TEXAS PACIFIC COAL AND OIL COMPANY
FORT WORTH, TEXAS
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-TP-AERO MOTOR LUBRICATING OIL
REG. U. S. PAT. OFF.

2776

"Van Dorn" SIX-INCH BENCH GRINDER



No. G-200 (Ball Bearing)

$35.00

A rugged, efficient utility bench grinder with power and long life built in by Van Dorn. Ideal for tool dressing, sharpening hand tools and light grinding of all kinds. Convenient handle makes this grinder easily portable and rubber pads on base eliminate necessity of bolting grinder to bench for light work. Priced within reach of even the smallest shop.

SPECIFICATIONS

MOTOR—Completely enclosed, split phase type with starting current to meet latest central station requirements. Operates from lighting circuit.

BEARINGS—Shaft is mounted on ball bearings with dust-proof housings.

WHEEL GUARDS—Open-end Guards, with openings adjustable for grinding at any point on circumference of wheel. Tool rests mounted on guards and adjustable to wear of wheel. (End covers can be secured for guards, at extra cost, where safety codes require enclosed guards.)

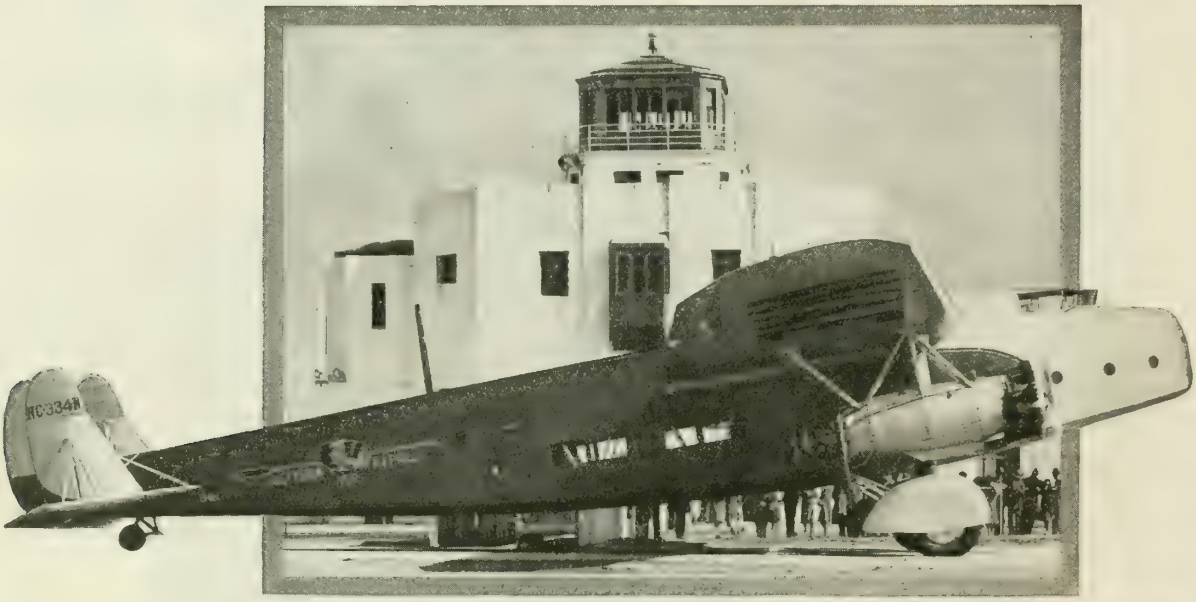
EQUIPMENT—Two 6" x ½" x ½" grinding wheels, wheel guards and tool rests, three-wire cable and plug. Switch in base. Base equipped with rubber pads, and metal plate to enclose switch and motor connections. Carrying handle.

CURRENT—Supplied for 110 volt, 50/60 cycle alternating current. Other voltages available at additional cost.
NET WEIGHT—36 lbs.

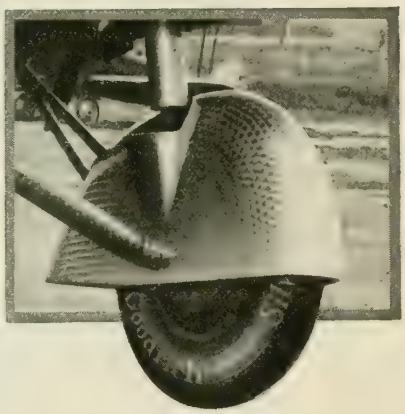
Ask your jobber about Van Dorn Electric Tools for maintenance work.

The "Van Dorn" Electric Tool Co.
TOWSON, MARYLAND

SAFEGUARDING
America's Largest Planes



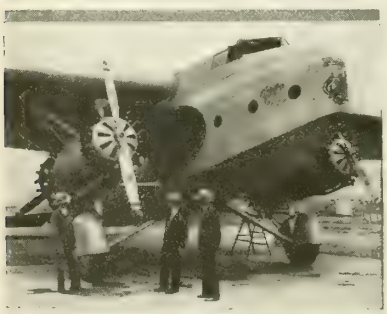
Giant Fokker F-32 Transport Ships operated by Western Air Express equipped with huge 58 x 14 Goodrich Silvertown Airplane Tires . . .



5,000,000 MILES flown since 1923 without a single passenger injured . . . a financial success on a par with its long record of safe performance . . . Western Air Express owes its exceptional advance in the aviation industry to carefully conducted operations—both executive and mechanical—*and the consistent use of the finest equipment* available.

And the finest equipment available includes Silvertowns, of course, for the Western Air Express knows from experience that Goodrich Tires give the maximum in safety and long wear. Other operations as well choose Silvertowns for their stamina and dependability under all conditions of flight. The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Company, Los Angeles, Calif.

In Canada; Canadian Goodrich Company, Kitchener, Ont.



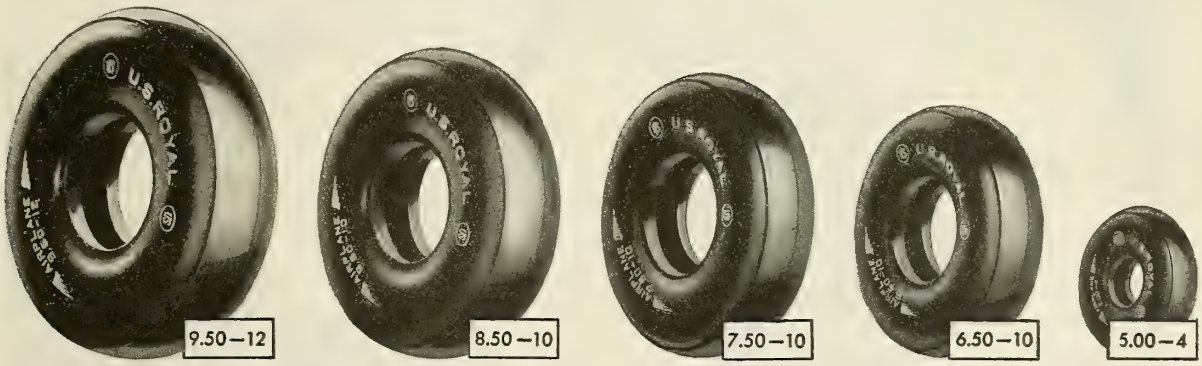
The immensity of Silvertown Tires on the F-32 is evident from a comparison of the men standing by the plane

Goodrich
Rubber for Airplanes

another B. F. Goodrich Product

Over 40 rubber articles for airplanes . . Silvertown Tires . . Tail Wheels . . Streamline Windshields . . Hose . . Tubing . . Engine Mounts . . Crash Pads . . Accessories

INTRODUCING LOW PRESSURE



U.S. ROYAL AIRPLANE TIRES

United States Rubber Company now introduces a most advanced and practical improvement in tires for aircraft. These low pressure tires provide increased safety in flying operations through easier landing, and ground performance is much improved. Larger ground contact permits flying from soft and muddy fields with safety.

These tires are scientifically designed and built by long-established standard production methods. Basic manufacturing processes, using Web-Cord construction and flatband building, are incorporated—thus giving greatest strength of tire with minimum weight.

Aerodynamic drag, weight and cost of the new tire and wheel assemblies are comparable in every way with present high-pressure equipment. The sizes now available are 6.50-10, 7.50-10, 8.50-10, 9.50-12 for landing wheels and the 5.00-4 for tail wheels. A full line of all sizes will shortly be available.

UNITED STATES RUBBER COMPANY—WORLD'S LARGEST PRODUCER OF RUBBER


The one unit
the entire
industry
OK's
as standard
equipment
KELSEY
· HAYES ·
AIRPLANE WHEELS

300 CONTINUOUS HOURS • 7200 TAKE OFFS



● *Air Ferries, Ltd., plane taking off for Oakland. San Francisco in background.*

AIR·FERRIES LTD.
PIER 5
SAN FRANCISCO, CALIF.
TELEPHONE GARFIELD 4787

April 17, 1930

Stanavo Specification Board, Inc.
225 Bush Street,
San Francisco, California.

ATTENTION: Captain S. S. Chadderton.

Gentlemen:

During the last two months we have carried 20,000 passengers in our air ferry service between San Francisco and Oakland, making approximately 7,200 water landings and take-offs. The conditions encountered have been a most severe test for both airplane and engine.

We have just completed major overhauls on our Pratt & Whitney "Hornet" engine #493 and our Wright "Cyclone" #11014, after over 300 hours of service. Our Chief of Operations, Mr. Samuel Metzger, tells me that these engines are in exceptionally fine condition considering the gruelling test to which they have been subjected, and he feels that their condition is due in no small measure to the use of high grade lubricating oil.

Inasmuch as we have used the new Stanavo Aviation Engine Oil exclusively, we felt you would be pleased to hear of this performance and are passing the information along to you for what it may be worth.

Very truly yours,

AIR FERRIES, Ltd.,

Jos. J. Tynan, Jr.,
President.

J

THE AIR FERRIES, LTD., has the distinction of being the shortest, but most frequent air service in the world. During the first sixty days of operations, it smashed all regular run air line records, by carrying 20,000 passengers across the Bay—between San Francisco and Oakland. Taking off and landing on the water, its sturdy Keystone-Loening Amphibions make 74 crossings, at 15 to 20 minute intervals, every day.

Like the planes of the Boeing System and Aviation Corporation, operators of the country's *longest* air transport systems, Air Ferries, Ltd., on their *short*, but gruelling flights, use Stanavo Aviation Engine Oil for the lubrication and protection of their powerful motors.

Stanavo is easily obtainable in all parts of this country. It is always uniform in quality—the best Aviation Engine Oil that can be made.

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AVIATION ENGINE OIL
One Brand—STANAVO. One Quality—the Highest—Throughout the World
STANAVO SPECIFICATION BOARD, Inc.

Organized and maintained by

Standard Oil Company (Indiana)
910 S. Michigan Ave., Chicago

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225 Bush St., San Francisco

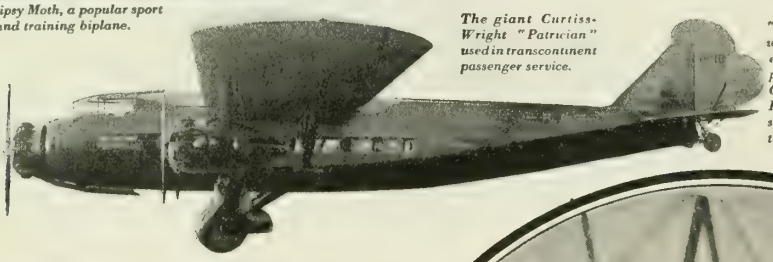
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26 Broadway, New York City

PARTS AND ACCESSORIES · AIRPORT OPERATIONS · AERIAL MAPS



. . . . Wings Bring *Master the Air*

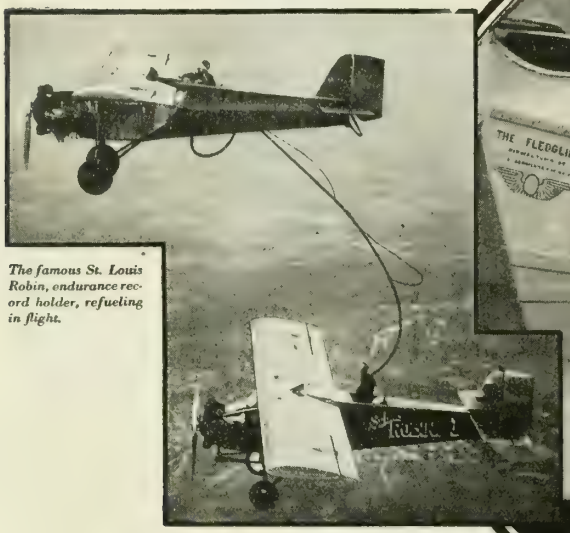
The Gipsy Moth, a popular sport and training biplane.



The giant Curtiss-Wright "Patrician" used in transcontinent passenger service.

Chas. S. "Casey" Jones, world-renowned pilot and president of Curtiss-Wright Flying Service, supervises its training activities.

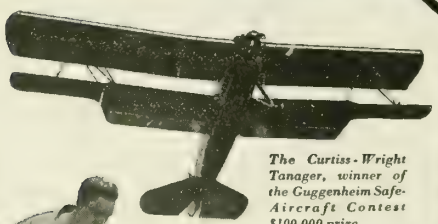




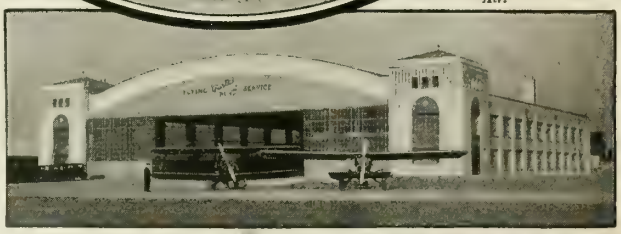
The famous St. Louis Robin, endurance record holder, refueling in flight.



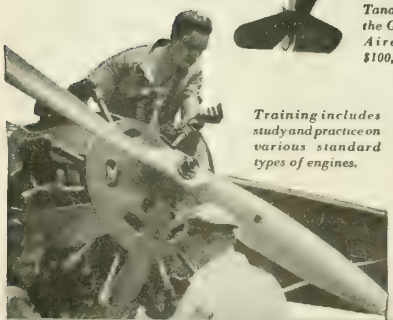
Ready for flight. Curtiss-Wright training methods are based on years of instruction experience. They make "Masters of the Air."



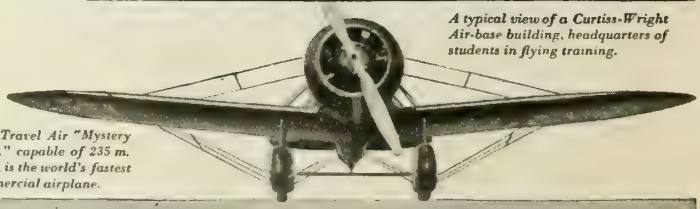
The Curtiss-Wright Tanager, winner of the Guggenheim Safe-Aircraft Contest $100,000 prize.



A typical view of a Curtiss-Wright Air-base building, headquarters of students in flying training.



Training includes study and practice on various standard types of engines.

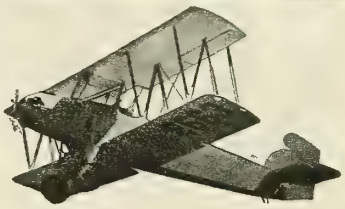


The Travel Air "Mystery Ship," capable of 235 m. p. h., is the world's fastest commercial airplane.

AERIAL PHOTOGRAPHY · GROUND SCHOOL INSTRUCTION

FLIGHT INSTRUCTION · TAXI AND CHARTER SERVICE · SIGHTSEEING TRIPS

Swift Success . . . . . *with* CURTISS-WRIGHT



"TRAINED by Curtiss-Wright" identifies you as a master pilot in this era of wings. It means that you have been trained by the "world's oldest flying organization"—that you are a member of a flying fraternity whose membership includes many of the greatest names in aviation. Curtiss-Wright training means thorough knowledge of planes and engines, outstanding flying ability, supreme confidence in every circumstance.

The famous organization known today as Curtiss-Wright has advanced directly over a period of nearly thirty years from the first discoveries and developments of two of aviation's greatest pioneers. Curtiss-Wright is a leader in modern aeronautical progress. You have learned from headline and picture that the Curtiss-Wright "Tanager" plane recently won the Guggenheim safe-airplane prize of $100,000. The Curtiss-Wright engineered Travel Air "Mystery Ship" proved itself the fastest commercial airplane ever built. The Curtiss "Robin" holds the world's endurance record. These exploits are indicative of the vast resources of the organization with which you enroll for training.

As the world's largest manufacturers of aircraft and engines, largest owners and operators of airports, foremost instructors in mastery of the air, Curtiss-Wright is able to offer you unusual advantages for training. Curtiss-Wright ground and flying schools, forty in number, are located throughout the United States. All are so completely equipped that they can be truthfully described as Universities of the Air.

Your ground training comprises every phase of aviation—theory of flight, aircraft construction, operation and maintenance of engines, rules of the air, weather conditions and elements of navigation.

Veteran flying instructors with hundreds of hours of flying instruction to their credit will impart to you their knowledge and skill. There is no "run of the mill" in Curtiss-Wright training methods. Every student is instructed as an individual and advanced steadily to an ability worthy of the term, "trained by Curtiss-Wright."

New, modern training planes that encourage confident control are in use in every school. In addition, you will have an opportunity to study at first hand many types of planes—from the light, swift sport planes to the giant air liners. You will learn about the operation of airports and transport service. Every minute of your training will be pleasant as well as instructive.

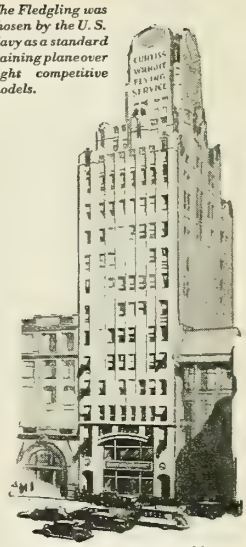
The period of training is so planned that it may be modified to suit your convenience. If, by reason of other duties, you are unable to devote time daily to training, hours may be arranged for you during spare time or on Sundays. Many men in business and industry have mastered the air during spare time.

The cost of Curtiss-Wright courses is reasonable, and to place it within the means of all, term payments may be arranged to distribute the expense over a period of six months to two years, depending on the course taken.

Curtiss-Wright cordially invites you to visit any of its flying schools and learn at first hand the completeness of its facilities and methods. Talk with any Curtiss-Wright trained pilot. You will find him a thoroughly competent flyer, proud of the "flying start" he received from Curtiss-Wright.

The finest flying season of the year is here now. Smiling skies and long, pleasant days will speed your training. Now is the time to take the first step toward mastery of the air with Curtiss-Wright. If you desire further information, fill out the coupon below, check the items in which you are interested and mail it today. The world is calling for men who *know* aviation in all its branches. Prepare yourself for greater success—now.

The Fledgling was chosen by the U. S. Navy as a standard training plane over eight competitive models.



The Curtiss-Wright Building, in the heart of New York. From here all aviation activities are directed.





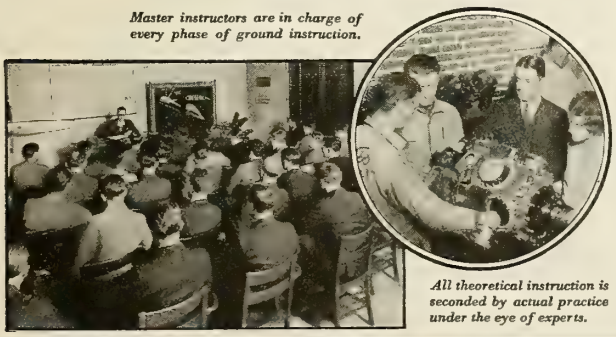
Instruction by veteran pilots is suited to the individual. Supreme confidence and skill are the result of Curtiss-Wright methods.

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Gentlemen: I am interested in Aviation and would appreciate more information on the subjects I have marked X.

- ☐ Flight Instruction
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- ☐ Aviation for the Business Man
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HEYWOOD STARTER

SKY SERVICE

Again, one of the best known names and authorities in airplane manufacturing is coupled with that of Heywood. For now the new Sikorsky S-39 Amphibian comes equipped with a Heywood Injection Starter.

So sound, so fundamentally correct has the **injection fuel principle** proven itself to be, that the adoption of Heywood Starters by manufacturers has become a veritable procession.

Light in weight, with but few moving parts and simplicity itself in operation, the Heywood Starter assures instant starting from the cabin seat, under all climatic conditions.

Installation on any standard aircraft engine is quickly and readily made. Write for descriptive literature.



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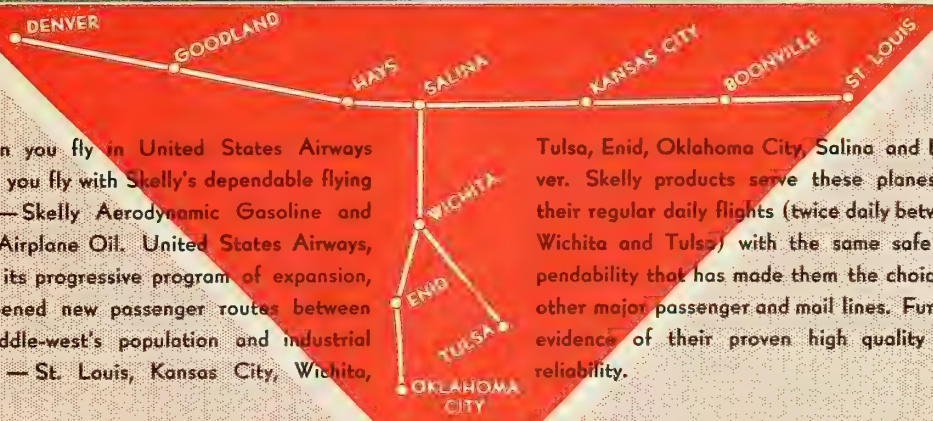
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Talking About Speed!

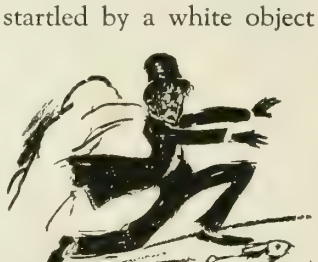
BY

E. B. GALLAHER

Treasurer, Clover Mfg. Co.

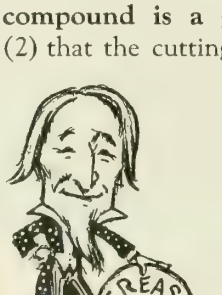
Editor, Clover Business Service

You know, rabbits *think* they are some runners; but, when the colored Deacon, walking through a graveyard one dark night, was startled by a white object jumping out at him, he started to run down the road—Mr. Rabbit right in front, but not going fast enough to keep out of the way, the Deacon yelled out, "Git one side there and let a fellah run w'at KIN run."



I can't help getting a good laugh at the expense of the bunch who have been yelling their heads off about the alleged "speed" of certain water-mixed valve compounds, and the "passing" of grease mixtures; **for, now come the long-awaited Government findings and specifications, dated May 1st, 1928, governing future purchase of abrasive compounds and knocking all this bunk into a cocked hat.**

The Government, after months of laboratory work, finds (1) **that the fastest cutting compound is a grease mixture, which cuts** $3\frac{7}{10}$ times faster than any other; (2) that the cutting speed is entirely dependent on the quantity of **truly graded** grains; (3) that the grease binder is so superior to the water-mixed binder that (4), **in the future only grease-mixed compounds will be used, and no water-mixed compounds will be bought.** Going some? But, after all, it is quality that always decides in the end.



If you haven't used the latest developments in Clover Grease-Mixed Grinding and Lapping Compound, you had better get next—**we** have always known there was nothing faster—a million mechanics will tell you that quality of work cannot even be approached with anything else.

You might as well have the best—costs no more.

Glad to send you samples.

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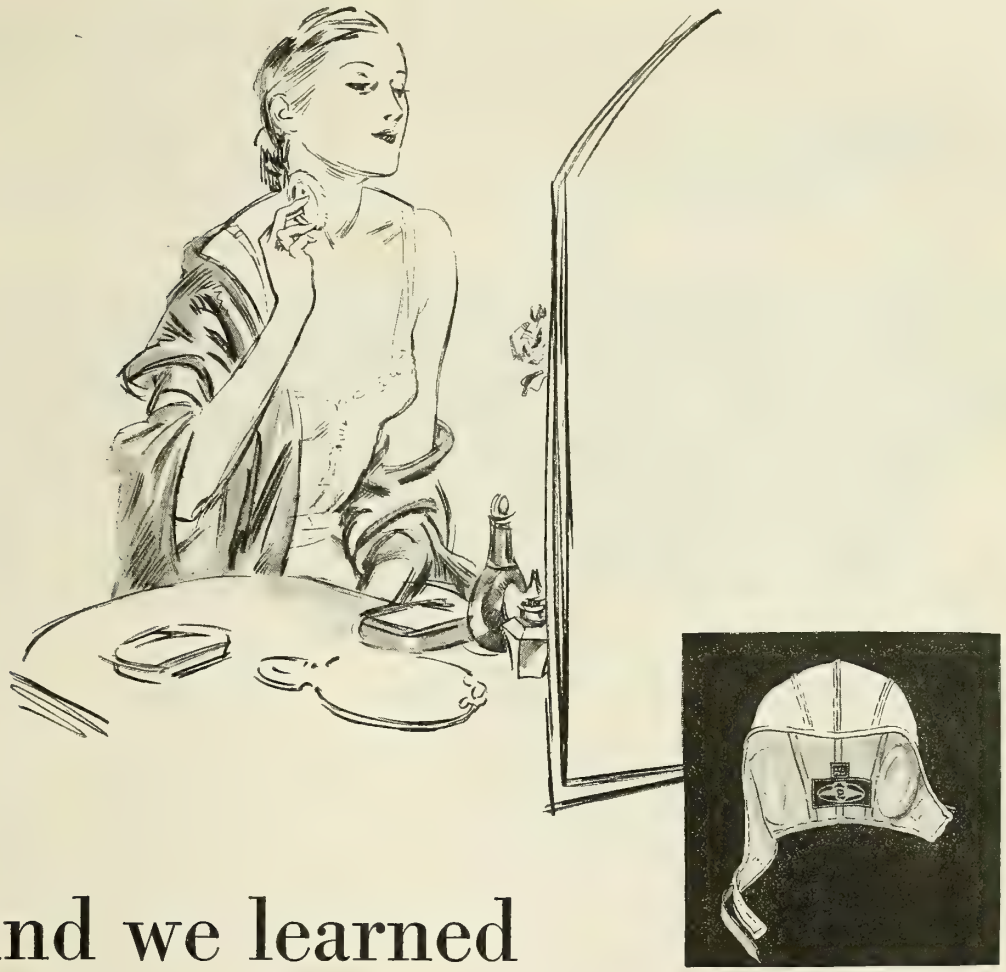
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Clover GREASE-MIXED Grinding and Lapping Compound . . .

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Character of Business



And we learned about helmets from *her*...

TURN back the ear flaps on a Spalding Summer Helmet. Observe that round white object nestling in the inner shell. A *powder-puff?* Yes sir....

For, when it comes to vetoing engine roar, Spalding has found that a puff in the ears is worth two on the nose.

So Spalding gratefully appropriates a woman's beauty aid—and makes of it a device which definitely locks out noise. Give *us* a little credit, though. Because *we* evolved the method of stitching in the puff—making it even more effective as an anti-noise crusader.

Put on a Spalding Summer Helmet. Feel how snugly it fits—yet how light and cool it is. Then think this—that these fine helmets cost very little.

For instance, a white unlined canvas helmet, with puff ear pieces, $1.75. One of unlined white Gabardine, $2.50. And one of thin suede leather, gray or tan, $3.50.

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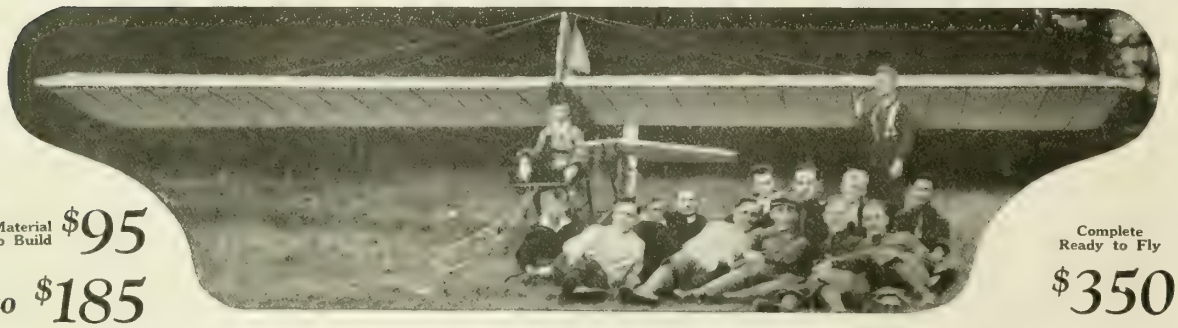
AVIATION EQUIPMENT

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Imperial German Ace Glider

The World's Best Air Training Ship



Material to Build $95 to $185

Complete Ready to Fly $350

Student fliers Deutscher Luftfahrt Verband, Berlin, Germany

Get Your Friends Together

You can get a few of your friends together and at total expense of less than Ten Dollars each, you can build and own an Imperial Primary Training Glider.

In the famous German Flying Schools at Rossitten and Wasserkuppe and in the Berlin glider Verbands there are three distinct types of Gliders used.

First there is the Primary Training Glider of the Imperial Ace type, designed to be easily and safely handled in the air by students entering Aviation. These ships are sturdily built to withstand the hard knocks given them by tyro fliers. The fact that this type is used everywhere in Germany as well as at Cape Cod in America attests its suitability for glider training.

The other types are a primary glider of somewhat less strength but not suited for high altitude flying and the Sailplane built and designed for soaring flight.

How to Form a Glider Club

Four or five young men (or girls) meet, organize and arrange to interest three or more additional members each.

Then write immediately to the headquarters of the National Glider Association, Union Trust Building, Detroit, Michigan, for necessary information and blanks to have the club affiliated with that body.

Order Your Imperial Now for Immediate Delivery

The Imperial German Ace P. T. G. 1

Built in Camden, New Jersey, under the supervision of men licensed by the United States Department of Commerce Aeronautics Division. Each part is thoroughly inspected before being accepted for use in building the complete ship or being shipped from the factory as a unit.

Engineering details are closely checked by one of Germany's leading glider experts and no expense has been spared in making the Imperial the safest, sturdiest, best performing glider training ship produced to date.

Wing Span ..... 32 ft. 8 in.
Chord ..... 63 in.

Completely assembled—ready to fly. $350 F. O. B. Factory, Camden, N. J.

Crating at cost for long distance shipment.

Gliderbuilders Outfit No. 2

Consists of all materials in unassembled form similar to that used in completed Imperial P. T. G. 1, except wires, bolts, turn-buckles and covering.

WE SHIP YOU

All hardware fittings.
All spruce for ribs, ailerons, stabilizers, elevators and rudder machined to exact size ready to assemble.
All necessary plywood in sheets.
All spars, trusses and other spruce and ash parts fully machined to exact size and streamlined where necessary.
One full sized sample of each type rib to facilitate quick building of your ship.
Full instructions for building and complete set of all necessary tools FREE.

All for..... $95 F. O. B. Camden, N. J.

Complete set of jigs for building ribs, ailerons, stabilizers, elevators and rudder, $15.00 set. Special price to builders of No. 2 outfit $4.50

Gliderbuilders Outfit No. 1

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All ribs fully assembled.
All spars fully machined.
All woodwork of spruce, ash and plywood, cut to size.
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All hardware fittings and turnbuckles.
All wing, aileron, and tail group covering fabric.

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Full instructions for building and complete set of all necessary tools FREE.

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Orders for complete Imperial German Ace Gliders or sets of parts will be filled in order received. At the present time immediate shipment can be made, but due to increasing number of orders this condition will not continue to exist. In order to insure early delivery, mail $25.00 by check, money order, or cash immediately. Advise whether you wish immediate shipment or whether you wish to have more time to complete your financial arrangements. You can pay for the balance of material when it is delivered to you. All shipments are F. O. B. Camden.

Special Offer

In order to permit builders of No. 2 Gliderbuilder's outfit to commence their Glider construction without delay, we will ship immediately upon receipt of $25.00 all material (except hardware) for ribs, ailerons, stabilizers, elevators and rudder, including jigs. Pay $25.00 additional when this material is delivered to you and start to Build Your Own Ship immediately. When ribs, etc., have been built by you, you may notify us and we will make immediate shipment of balance of material in accordance with your instructions and you can pay the balance to the express company when it is delivered. This offer will enable you to **fly your own ship** within a short time, **if you rush your order now.**

Send for Booklet and Catalog B of Gliders, Hangars and Supplies

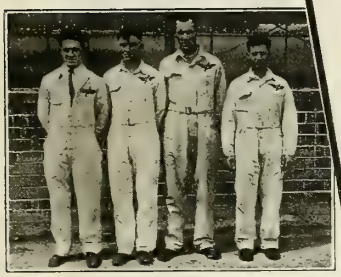
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Under this plan you can now receive the famous Ryan Transport (Government Approved) Flying and Ground Training Course, plus a new 1930 Great Lakes airplane, for a total price that is less than some schools charge for a Transport Pilot's Course alone.



There are no strings to this offer. The new Great Lakes plane is issued to you as soon as you enroll. Put your name on it. No one except you and your instructor can fly it. It is your personal ship to be used by you exclusively for training, pleasure or business.

This RYAN "Training—*plus* Plane" plan gives the two great essentials for success: First, the most thorough and complete training available and, second, one of the finest and most efficient modern airplanes with which to capitalize on your investment as soon as your training is completed.

WHAT THIS OFFER INCLUDES

The Great Lakes Sport Trainer is recognized by aeronautical authorities as one of the most dependable of new production planes. Powered with the famous 90 h.p. Cirrus air-cooled motor it develops a top speed of 110 m.p.h. with an upkeep cost of a small automobile. Designed by former Army and Navy aeronautical engineers its pronounced "sweep back" gives it the appearance of an Army or Navy pursuit plane. It is so structurally strong that it holds the World's record for outside loops, and yet so easily is it handled that Ruth Alexander, a RYAN student with only 18 hours of flying experience, used it to establish the World's Altitude Record for Women in Light Planes.

The regular Ryan Transport Course provides 200 hours of flight instruction with 2,000 miles of cross-country flying over mountains, desert and ocean; also the necessary night flying and 10 hours of cabin ship instruction in a Ryan Brougham. With this is included 400 hours of most thorough ground school instruction and all other advantages of training at this world-famous school in balmy San Diego on the edge of the blue Pacific—the home of the United States Government's largest aerial operating force and scene of the country's greatest year 'round flying activity.

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A suggestion: Due to the necessity of ordering each student's plane approximately one month in advance of this training, we suggest making further inquiries immediately to avoid future delay.

☐ CHECK HERE For further information about the RYAN "Training—*plus* Plane" Course.

The T. C. Ryan Flying School invites the attention of those who are interested only in the highest standards of aeronautical training. Ryan Approved Training costs less than training at some schools that have not been approved.

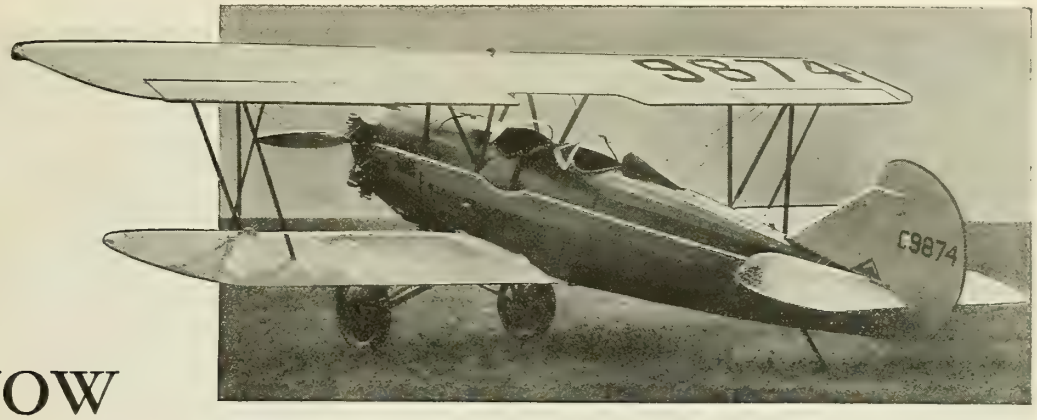
Courses include:

***The Transport Course**	**200 Flying Hours**		
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****These courses include 400 hours of Ground School with Lectures, Laboratory and Shop Practice.***
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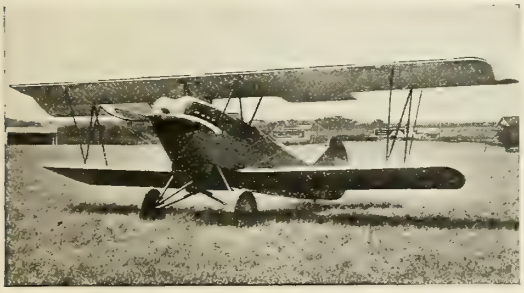
TYPE 4-D, powered with J-6 225 H.P. Wright Whirlwind engine—speed up to 132 M.P.H.—ceiling 16,500 ft.—cruising range 550 miles.



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Operating better ships means increased profits to you. Low prices of Travel Air put both within easy reach. Write today for full information. Address Department T-70 Sales Division, Curtiss-Wright Corporation, 27 W. 57th St., New York.

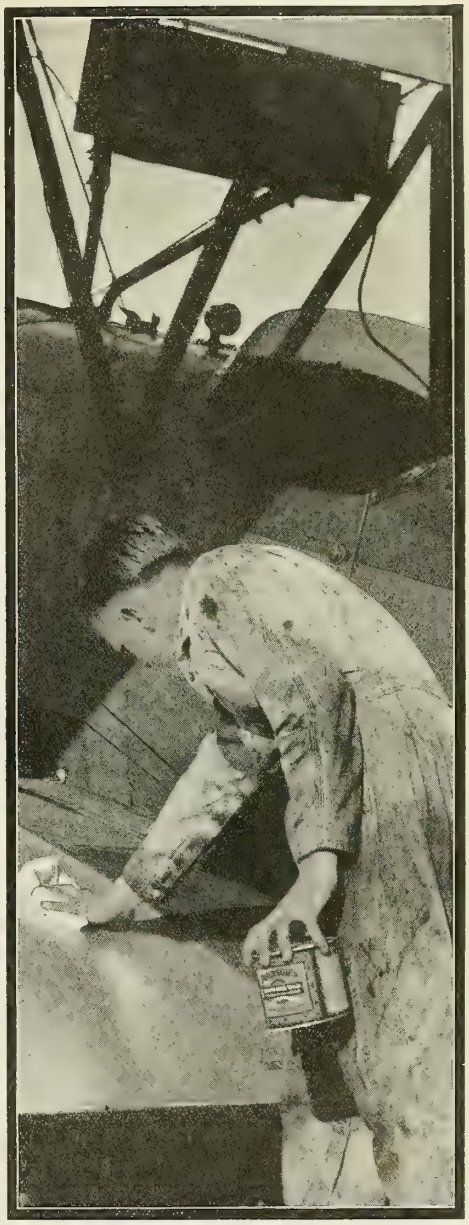
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WITH Douglas there is a reason for capacity production...that reason is demand, definitely created when Douglas planes first flew around the world. Demand for planes bearing the Douglas name has been maintained, increased, firmly entrenched...by the consistant, dependable, unfaltering performance of the planes themselves. Proving as time goes on the fundamental soundness of Douglas engineering, interpreted by craftsmen of the highest order, using the best materials money can buy. Now, Douglas planes are flown throughout the world, proclaiming every hour, every day, the one important fact that Douglas means dependability. Tomorrow's plane is taking shape in the laboratory of the Douglas plant, today. Production means demand with Douglas!

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● Tex LaGrone is the Waco distributor in Kansas City.

● "I thought you might be interested," he writes, "to know of the satisfactory results I am obtaining from the Johnson's Wax being used on my planes.

● "I have found from practical experience that giving new ships a couple of coats of this wax as soon as they are delivered from the factory, makes them retain their new appearance much longer and also prevents the oil and grease leaving spots on the wings. There is no question but that the life of the fabric is thereby prolonged.

● "I am expecting to receive from the Waco factory one of the new Model "F" Wacos and the first thing I intend to do will be to have it given a couple of coats of Johnson's Wax."

NOT EXPENSIVE ● NOT A TECHNICAL JOB

Anyone can wax a ship for very little expense. Apply it with an ordinary soft brush or cloth and polish with clean cloth. Only precaution necessary is to have ship clean. Johnson's Wax will not discolor fabric or finish. ● Use the coupon below to send for free sample. Apply on one wing and notice how much *cleaner* that wing stays. To get the most acceleration out of your ship and reduce skin friction, apply wax on struts also.

FREE ½ LB. CAN

S. C. JOHNSON & SON, Dept. AD7, Racine, Wis.
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NOW you may buy an Inland Sport Monoplane . . . world's speediest light airplane . . . on the time payment plan. Pay a small amount down, and the balance in convenient monthly installments.

Due to the sturdy construction and the high factor of safety which characterize Inland Sports, finance companies and insurance companies have made very favorable arrangements for time-payment purchasers. Here's a ship that will "last" until it's paid for . . . and a good many years more!

Manufactured at Fairfax Field Under Approved Type Certificates 295 and 315

Airplane dealers who desire to secure the franchise for a light 'plane will be eager to study the advantages of Inland's new time-payment plan. Full details will be sent to dealers and prospective individual purchasers on request.

INLAND AVIATION COMPANY
KANSAS CITY, KANSAS



THE DAWN PATROL OF TODAY



EACH morning at the Spartan School of Aeronautics the first streaks of day send up a patrol of training planes for dawn maneuvers. In the cockpits are Spartan student pilots who have come from all corners of the continent to study aviation at America's finest flying school. Some have barely reached the solo stage of training . . . others are up for acrobatics. But dawn finds them all fresh and enthusiastic for the day's training routine.

» Twelve years ago on the Western Front the dawn patrol had a special significance. Planes were then what we might regard as "crates." Today . . . . at the Spartan School . . . . every training plane is strictly modern, sturdily built and Government-licensed. Spartan student pilots who participate in the dawn patrol are scientifically trained by instructors licensed by the U. S. Department of Commerce, and flying is just wholesome, instructive fun.

» The Spartan School of Aeronautics is an ideal place for the young man who has selected aviation as his life's work. Spartan maintains an institution rich in tradition, sound in business principles, and financially responsible.

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SCHOOL
of
AERONAUTICS
TULSA, OKLAHOMA

SPARTAN SCHOOL OF AERONAUTICS,
Tulsa, Oklahoma.

Gentlemen: Please send me your 32-page book describing all Spartan School courses, extended tuition payment plans and information about free transportation to Tulsa.

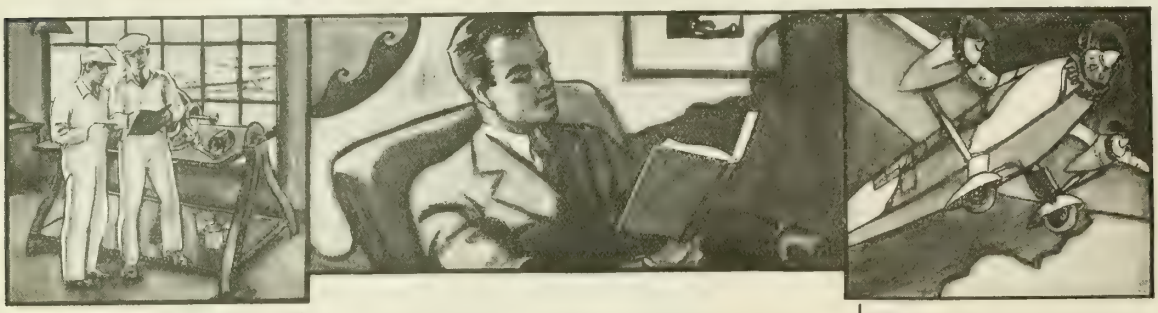
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By J. B. JOHNSON, M.E.

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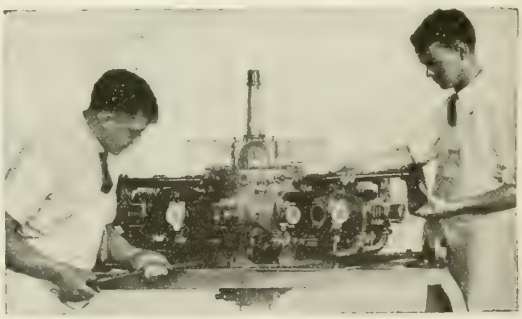
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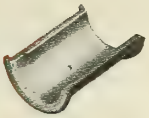
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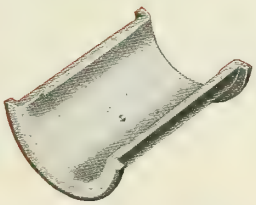
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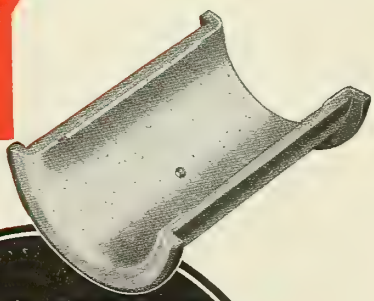
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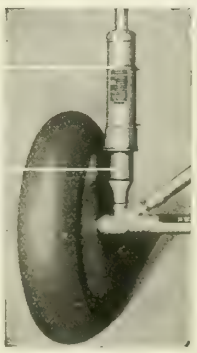
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"The demonstration on Aerol Struts we gave for the Dutch Government made a big impression and as a result, the Army adopted these struts for use on the Fokker single-seater fighters being built for use in Holland and the Dutch Colonies.

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"The Dutch Aero Club and Dutch National Flying School use Aerol Struts exclusively and are absolutely sold on their value. They feel it to be a fact that many crashes made by pupils previous to their use of Aerol Struts would have been prevented."



This view shows how Aerol Struts are installed between the fuselage and wheels. "A" is the stationary cylinder. "B" is the sliding piston attached to the axle allowing perfect freedom of movement, yet effectively eliminating destructive shock before it reaches the fuselage.

Wherever ships are flown — wherever pilots get together— Aerol Struts are recognized as the finest protection that can be given any plane.

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Fairchild KR-21 A. T. C. 215 Two Place

Performance: Top speed, 113 m.p.h. Climb, 775 ft. p.m. Disposable load, 885 lbs.

Specifications: KR-21 Trainer, $4125 flyaway Farmingdale

Kinner 100 h.p. engine and wood propeller. Oleo landing gear. Bendix brakes may be installed at slight additional cost. Air wheels with brakes also obtainable at slight extra cost. Complete equipment: altimeter, gasoline gauge, booster magneto, tachometer, oil pressure and temperature gauges, dual controls, engine cover, tools, fire extinguisher, first-aid kit, engine instruction book, log book, celluloid inspection windows at all control bearing points, detaching pan.

KR-21 Sportster, $4375 flyaway Farmingdale

Same equipment as the Trainer, plus upholstery, extra oil-pressure gauge, compass, airspeed indicator, propeller spinner and cockpit covers.

Fairchild KR-34 A. T. C. 162 Three Place

Performance: Top speed, 123 m.p.h. Climb, 800 ft. p.m. Disposable load, 885 lbs.

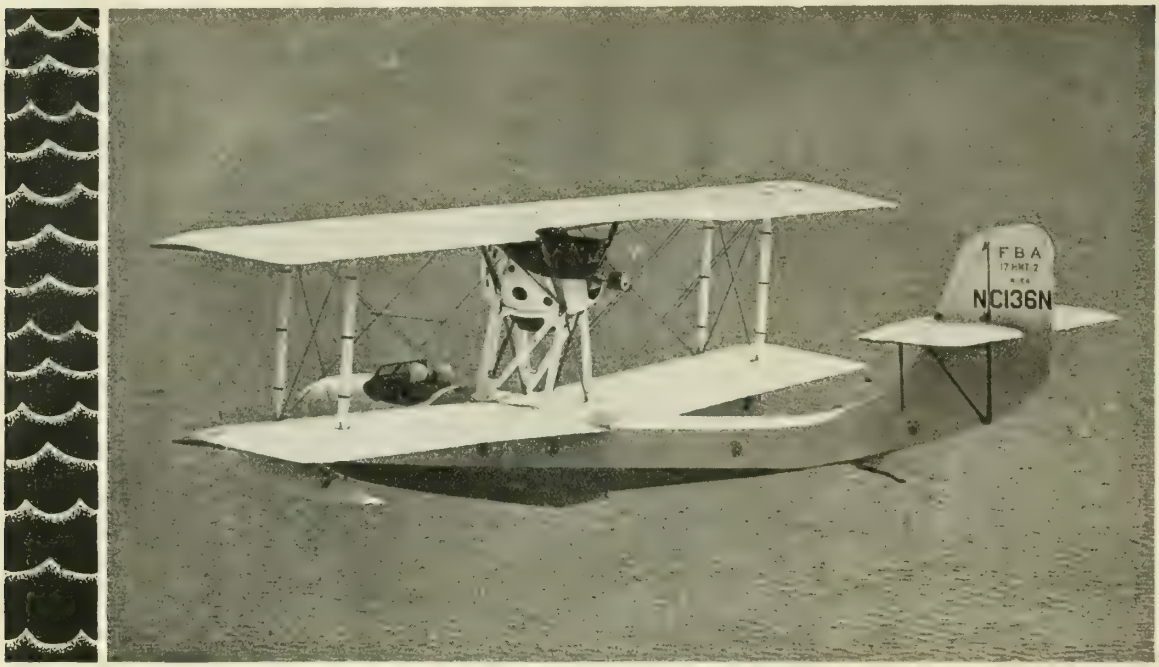
Specifications: Wright J-6, 165 h.p. engine and metal propeller. Oleo landing gear.

Bendix brakes may be installed at slight additional cost. Air wheels with brakes also obtainable at slight extra cost. Note really complete equipment; airspeed indicator, altimeter, compass, dash gasoline gauge, booster magneto, tachometer, dual controls, brakes, oil pressure and temperature gauges, cockpit covers, engine cover, log book, tools, first-aid kit, fire extinguisher, engine instruction book, wired for navigation lights. This plane can also be had with 165 h.p. Comet engine, which alters performance slightly and increases disposable load and economy. Price, with either engine, $6575 flyaway Farmingdale.

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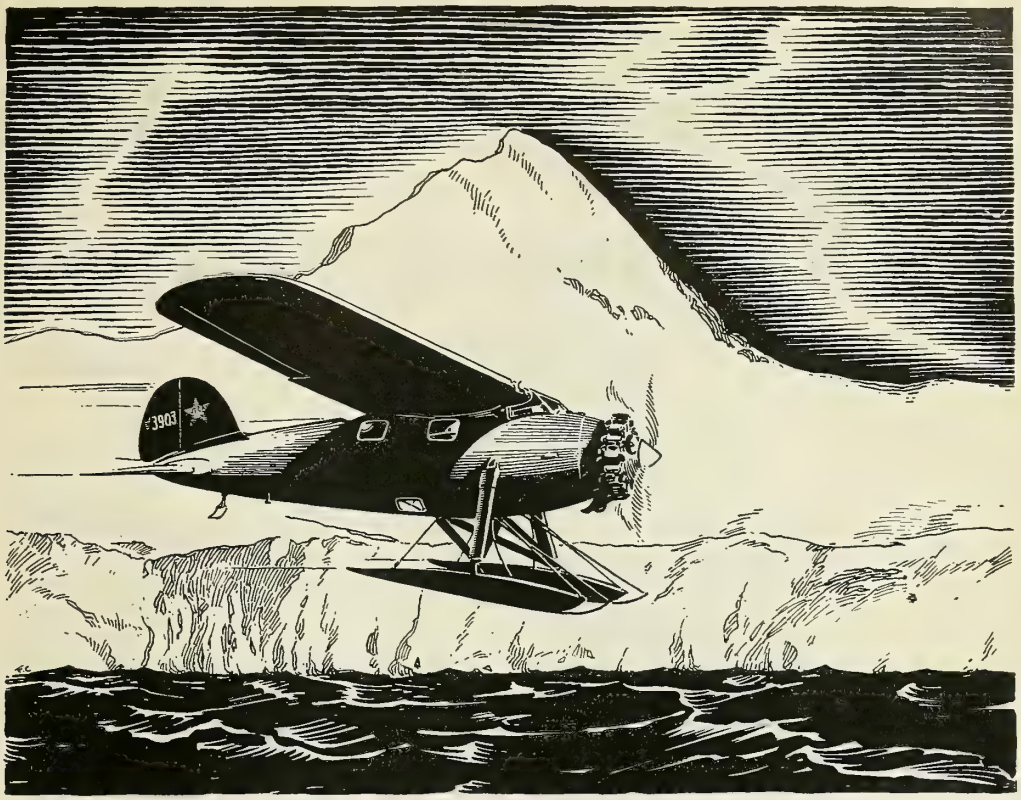
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—and he named it "LOCKHEED MOUNTAIN"



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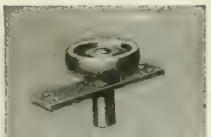
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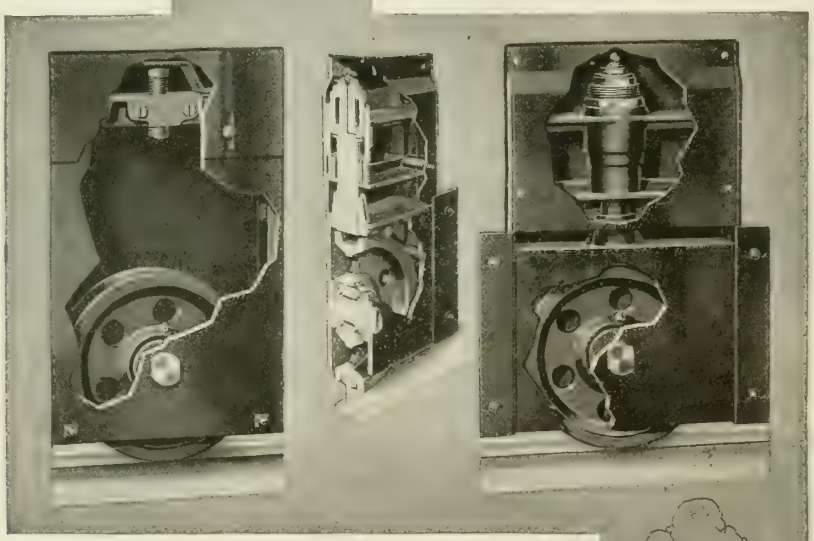
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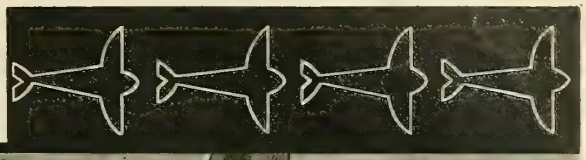


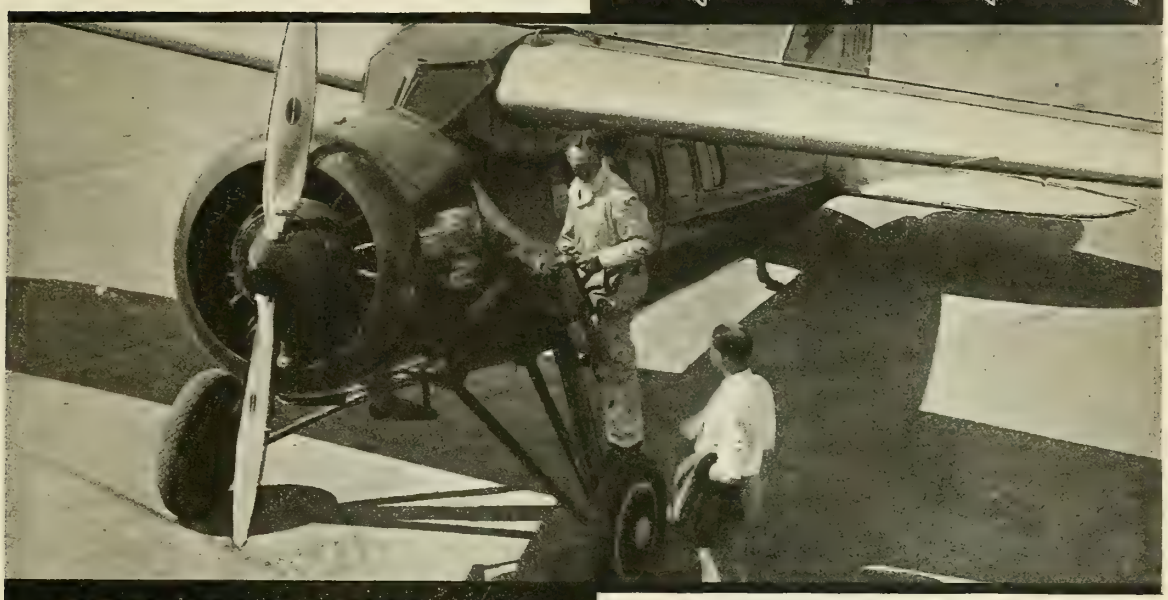
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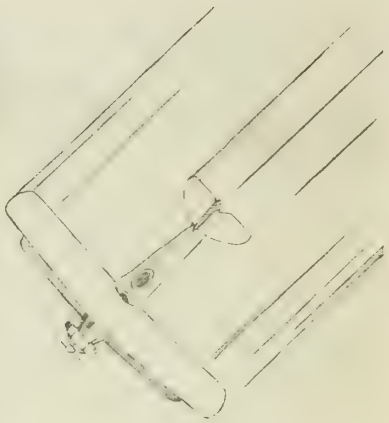
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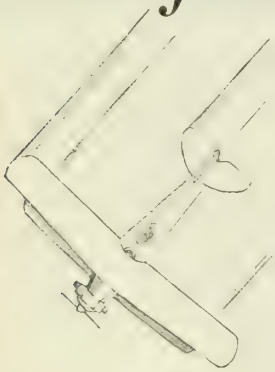
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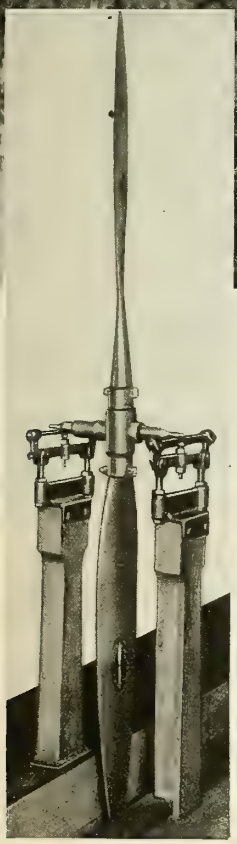
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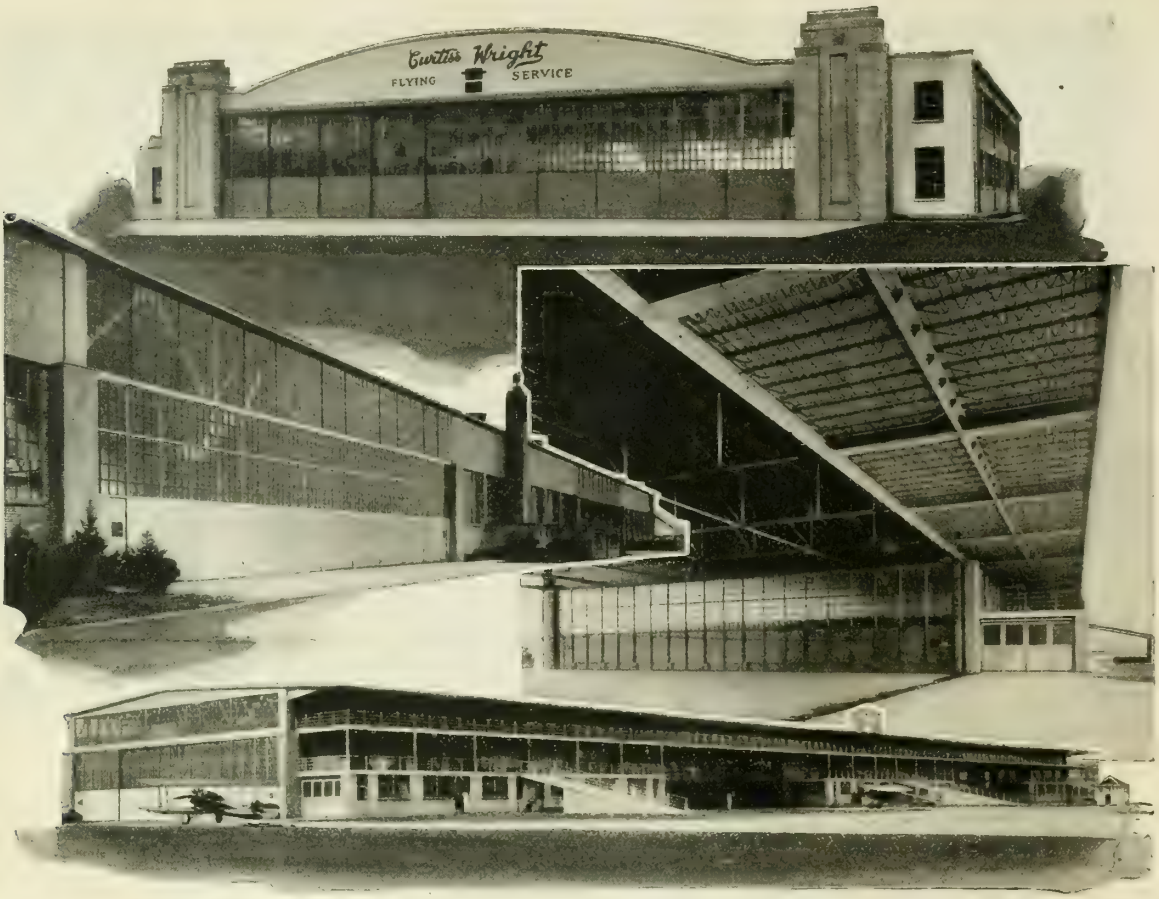
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Pioneer~

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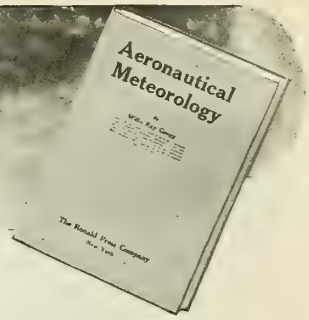
Packard lost its brilliant chief aeronautical engineer, but his work lives on. For Captain Woolson was an able executive, as well as an engineer, and carried forward with the development of the Aircraft-Diesel the building of an organization of Diesel specialists.

The Packard-Diesel is now in production and down through the years it will continue as a tribute to the pioneer who developed it—a living memorial to Captain Lionel M. Woolson.

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"Aeronautical Meteorology" supplies in convenient form the useful information needed by airmen without going into the more complicated branches of the subject, of interest only to professional meteorologists. It covers completely just what you must know about the atmosphere and weather conditions. It is readable and interesting—and at the same time simple, concise and accurate. It teaches you how to read weather maps at a glance. It tells you what sort of conditions to expect along your route when you see one kind of cloud or another. It explains wind direction and velocity at different altitudes, fogs, visibility, etc. Charts and photographs show you just what the author is talking about, and the numerous tables make reference easy.

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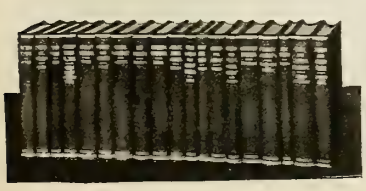
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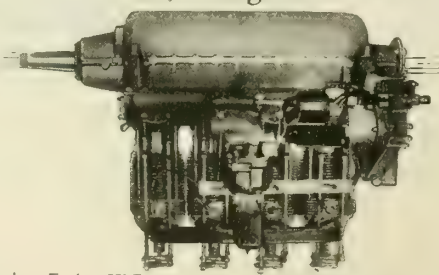


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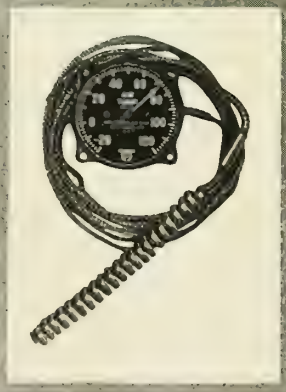




Model 2893A Oil Pressure Gauge
(Illustrated above)
Built to stand vibration and shock.
Conforms to government specifications.

Model C Motor Heat Indicator
(Illustrated on left)
The finest instrument of its kind.
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Model CA Ice Warning Indicator
(Illustrated on right)
Warns pilot when atmospheric conditions favor formation of ice.





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Airports have become transportation terminals

JULY, 1930
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AERO DIGEST
THE MAGAZINE OF THE AIR

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Cover Design: Aeronca Monoplane Equipped with Floats.



United States Army Air Corps Photograph

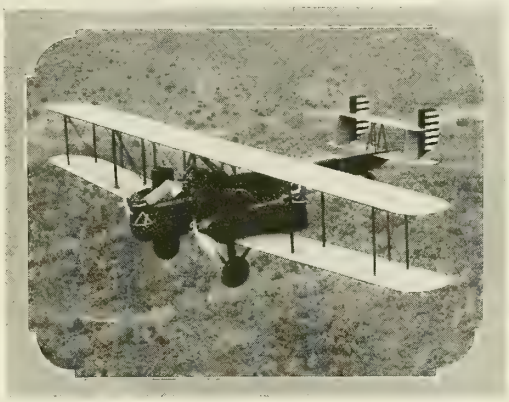
Army Air Corps twin-motored Keystone and Curtiss bombers on a cross-country formation flight. The Curtiss Condor at the center of this group is "Number 80," which is controlled by means of the Sperry automatic pilot described in the accompanying article by Lieutenant Marion Huggins.

GYROPILOT GOES CROSS-COUNTRY

By
Marion Huggins
Lieutenant, U. S. Army Air Corps

ON the morning of March 23, 1930, the 2nd Bombardment Group at Langley Field, Va., started on its 2,500-mile airtrek to the Air Corps Field Exercises at Mather Field, Sacramento, California. By squadrons the ships took off from their home field, the 20th Squadron leading with its Keystone LB-7s, followed by the Curtiss Condors (B-2) of the 96th Squadron. The Keystones, led by the group commander, Major Hugh J. Knerr, straightened out and headed southwest for Pope Field, S. C. The Condors, led by the 96th Squadron's commanding officer, Lieut. Harold Beaton, followed suit after the Keystones. In one of the Condors, Number 80, were Lieut. Beaton, pilot, and alongside him Mr. Elmer Sperry, Jr., of the Sperry Gyroscope Company. I was up in the nose; back in the rear cockpit was an enlisted radio operator and an enlisted mechanic. A moment after straightening out on its course, Number 80 had settled down and was hitting it off, both engines running smoothly, the stabilizer rolled to keep the ship's nose where it should be.

Whereupon Mr. Sperry reached back to a little aluminum-encased apparatus situated back of and between the two pilots' seats and pulled one lever, then another and still a third. Lieut. Beaton took hands and feet off the controls, taking into his lap instead a small block on the end of a flexible wire, the block having two buttons, one marked *L*, the other *R*. Until almost over Pope Field at Camp Bragg the plane flew thus, no human hands or feet at its controls. Occasionally the remote-control human pilot would press either the left or right button on the little block in his lap, the plane would steadily turn left or right to the required degree until the button was released. Occasionally one wing would go down on a particularly severe bump, then immediately right itself. All that Lieut. Beaton did was take it easy. I was having my navigating done for me by the leader of the group formation, and Mr. Sperry was also in his glory, poking and peering into the innards of G.P. there in its fourteen-by-fourteen-by-ten-inch case back of the pilots' seats.



Curtiss Condor with gyroscopic control installed

For G.P., or "Gyropilot," to give it the name Mr. Sperry has christened it, was going cross-country on the most grueling test it was possible to put it to since its birth some years ago.

For more than eighteen years the Sperry company has been interested in this machine, this mechanical pilot, called "Gyropilot" by the Sperrys, "Mecaviator" by the Air Corps which was furnishing the plane, and "Gyrobot" by others. (Coined in the office of the Chief of the Air Corps, the name Mecaviator, after six months' use, doesn't seem to "click" as it should. It is too easily the subject of punsters who wish to palm off alleged Scotch jokes on a helpless mechanical device. Nor does its official name, Gyropilot, seem to be much better. The latter describes it, but in a rather Teutonic and ponderous fashion. It needs a name badly, something with snap, a name of one syllable, preferably. The nautical world has a "Metal Mike"; surely the aerial world should have a name for its mechanical pilot as good as that describing the gyroscopic ship's compass.)

In 1912 an early model was installed and tested in a flying boat by the late Lawrence Sperry. Two years later a young engineer, Shiras Blair (now Captain, Air Corps, of Wright Field) made other tests and for the next few years was co-worker with Sperry on more extensive tests and development work. It was in 1914 that the device won a 25,000-franc prize in a safety contest in France. During the war there was a great deal of work done on it at McCook Field. After the war it was put to work in a Sperry Messenger, but although it worked all right under ideal conditions, it was in no condition to stand severe service tests.

With the recent developments in aerial transportation, a new demand for such a device has been created. Large transport operators are now watching its development closely; its adoption might mean money to them at some time in the future. When it made its recent hop over the Alleghanies from Wright Field to within fifty miles of Washington in a trimotored transport, it attracted more attention than it ever had in the past and held that attention by syndicated editorials for weeks thereafter.

And now, on the trip across the continent, under the watchful eye of Elmer Sperry, Jr., brother of the late Lawrence Sperry, it was once more taken from the laboratory and "put to work." The Air Corps was more than willing to allow the device to be installed in one of its planes flying across the continent. The Army had helped father the Gyropilot in its early days, and if the device were successful, it might be just as applicable to military as to commercial aircraft.

The trip it was now on was to prove an ideal one from the engineer's point of view, for there was flying through all sorts of conditions, varying temperatures and humidity, through smooth air and bumpy air, taxying through clouds of dust, over rough ground, flying through rainstorms—in short, every condition to provide an ideal proving ground for the little fifty-pound mechanical pilot.

Until it came time to land and the three clutches, aileron, stabilizer and rudder, were switched off, the automatic pilot worked perfectly. There was a brief stop of the entire group at Pope Field for refueling, then a take-off in the same formation as previously, bound this time for Maxwell Field, Montgomery, Alabama, via Augusta.

Once more the group swung out, headed 239 degrees to pass over Augusta, and all planes settled down in their places in the formation. Again Mr. Sperry threw in the three clutches. The two gyroscopes—one mounted vertically, the other horizontally—were turning at 15,000 r.p.m. The gyroscopes were "set" for level flight, laterally and longitudinally, and for flying in the direction of 239 degrees magnetic. If a bump of air caused a wing to drop, the gyroscope would feel it. Certain electric circuits would

make and break; one of the three pairs of electromagnets would be energized by the making of a certain contact which in turn would operate a small clutch connected with the aileron control, since in this case a wing had dropped and had to be corrected by aileron control to bring the plane back on an even keel.

Mechanical power is continually on tap through a flexible shaft from the generator supplying the juice to the gyroscope's armatures. When the clutch leading from and to the aileron control cable engages this power-shaft the aileron cables move in the proper direction, until the plane is brought back to an even position laterally. The gyroscopes, level-headed as gyroscopes usually are, signal the plane's being brought back to an even position by the breaking of the circuit which was previously made and the clutch from the aileron control disengages the power shaft. The plane flies on as before. The same relative action would occur should the nose drop or lift suddenly, or veer off to the right or left.



Left, Lieut. Marion Huggins holding gyroscopic unit. Right, Mr. Elmer Sperry Jr. with servo motor unit.

Another control, this one from the human master-pilot to his mechanical co-pilot, is the directional corrector, the small block with the *L* and *R* buttons on it, the block being connected with the Gyropilot by flexible wires. The pressing of either button deliberately makes a circuit energizing one of the pair of electromagnets which operate the rudder. While the button is held down, the rudder operates; when it is released, the rudder comes back to neutral and the plane is headed in the altered direction, corrected for a change in the formation leader's direction, which must be faithfully followed, or corrected for any other reason.

The Gyropilot may be relieved of duty by throwing off the electrical master switch which delivers juice to the gyroscopic armatures or by throwing either or all three of the actuating gears into neutral. The human pilot may then take over the controls and fly the plane to suit himself, which in this extended test flight was upon landing or when Mr. Sperry wished to make minor adjustments on the device.

On the second leg of the trip the Gyropilot had been operating about three-quarters of the time, being thrown out of gear several times when the formation changed altitude suddenly because of clouds and when it changed direction to a marked degree near Augusta.

On the stretch from Montgomery to Mather Field, the device received its severest service tests. On each leg of this route, the Gyropilot was in commission about one-half of the time. Between Montgomery and Shreveport heavy rains forced the plane close to the ground, where a human hand was needed at the controls. The moisture started corrosion on the contact points, but Mr. Sperry was not displeased at this. What he was after was a fool-proof, weather-proof device that would perform in all kinds of weather and under all varieties of conditions. If the present contact points corroded, he'd get some of a new material. He had already designed the device considerably oversize (or rather, overstrength) to take care of a plane much harder on the controls than the huge Curtiss Condor.

From Shreveport to Midland was pleasant sailing, but at Midland a new condition arose. Clouds and clouds of dust arose on the airdrome. The Keystones had already landed; their taxying to the line for gas had scoured the loose sand off the airdrome surface and shot it into the air. Quite a bit of it went in and around the intricate mechanism of the Gyropilot. Similarly at El Paso and at Tucson, the latter place being the worst as far as dust was concerned. The gyro, however, still functioned. At March Field, Riverside, California, conditions were good, but trouble was experienced with the electrical contact points. The device being sensibly designed, operates on a twelve-volt system, easily generated within an airplane but hardly enough voltage to go through points which have been corroded by moisture and dust. Nevertheless, it was still operating when Sacramento hove in sight and the master switch thrown prior to a human-made landing at Mather Field.

Several days thereafter Mr. Sperry flew to San Francisco. He was taking the mechanical pilot to his company's branch laboratory there for general clean-up and for new contacts of an alloy that would withstand the rigors of extended cross-country flying.

The overhauled Gyropilot was reinstalled in Number 80 to permit it to work in the "night raid" over San Francisco on April 18th, this time with Major Knerr as the master-pilot. Again, with Lieut. Beaton—the "master mind" he became known to his fellow officers when spoken of in conjunction with his work with the Gyropilot—as the chief pilot, and with Mr. Sperry and Mr. Hans Adamson, representing the Assistant Secretary of War for Aeronautics, as passengers, this huge bomber flew out over Golden Gate and straight out to sea in the defense-of-San Francisco problem on the noon of April 24th. Through no fault of the mechanical pilot, which was functioning perfectly throughout the entire trip, but as a result of failure of a fuel pump, the bomber was forced to return to shore after a sixty-mile trip to sea. It was this trip that caught the attention of the press, of which there were about seventy representatives at Mather Field during the Air Corps Field Exercises. The newspapers of the country were flooded with items and prophetical editorials on the work of this "instrument," as it was miscalled by many. Mr. Sperry remained unmoved, however, by all this attention. There was another trip back home, another jaunt of 2,500 miles, still ahead to put his Gyropilot to further test.

The following day, April 25th, the group departed for home, scheduled for a two-day stay at Los Angeles, and a three-day halt at San Diego. On the return trip conditions were about as severe as on the trip out, and the device was operated about half the time (*Continued on page* 208)

THUNDERSTORMS and LINE-SQUALLS

Martin L. Dobler
Member, American Meteorological Society

WE are at the present time entering the season of the year that is fraught with two dangerous types of atmospheric phenomena against which the pilot must take every known precaution. Here again, our weather maps will point out these danger spots that we should so guard against.

The thunderstorm and the line-squall are quite closely allied, the thunderstorm being less harmful by itself. The line-squall, however, as the word indicates, is a series of squalls or thunderstorms moving eastward in a long line and is caused by cold air being shoved out to replace the warm humid air. There are several other terms for line-squalls, all of them very descriptive; for instance, we have the "Polar-front" (or cold front), the "wind-shift line," and then the low, rolling white mass of turbulent clouds that are sometimes referred to as "wind-dogs" because they seem to run "on ahead" of the main body of the thunderstorm itself.

The structure of the summer thunderstorm we will find quite interesting. On a hot summer afternoon, in the west, we frequently observe huge "boiling-up" masses of cumulus clouds, commonly known as "thunderheads." These are the forerunners of the storm itself, and they gradually merge into a great solid mass of cloud, which at high altitudes, even at the 20,000-foot level, very frequently become anvil-shaped, and with the cold strata aloft, resolve into cirrus and cirro-stratus clouds at the very top. We may usually look for a thunderstorm danger spot on our map, in the southeast quadrant, say 300 miles distant from the center of an eastward moving "low pressure area." Assuming the lowest barometer readings were over western Pennsylvania and western New York States, New York City itself would be right within the disturbed area, with afternoon storms most likely.

I have referred to the "boiling-up" clouds accompanying the formation of thunderstorms, and this term best explains how these storms are actually born; they are the result of steep convectional "up-currents" of heated, humid air, immediately in front of a low pressure area, while to the rear of the "low" strong down-currents of cold air from higher pressure are met, causing great turbulence aloft, and severe bumpiness in flying. These turbulent up-and-down currents of air are not the only danger, for there is also the constant danger of lightning discharges which are flashing vividly from cloud to cloud, but more especially, the positive flashes from cloud banks to earth. Visibility is, of course, also greatly impaired during a thunderstorm.

When the pilot finds himself within the danger zone of thunderstorms, particularly on a summer afternoon when the temperatures are ranging from eighty to ninety-five degrees or more, he does well to observe most carefully the slow fall in the barometer, the haze condition of the sky about him, and the small but gradually larger cumulus clouds from the southwest and west at about 5,000 to 6,000-foot levels.

From years of observation, I have found the storms which approach from the southwest, as compared to true west, to be the most severe of all storms, both because of dangerous winds and severe electrical discharges. The tornadoes of the Middle West, with which we are all familiar, almost without exception move from the southwest toward the northeast.

A line-squall or a long line of heavy thunderstorms, stretched out in "marching formation," as it were, is usually caused not so much by a circular area of low pressure moving across the Great Lakes, as by a trough of low pressure which extends in a southwesterly direction from the principal center of the low barometer itself.

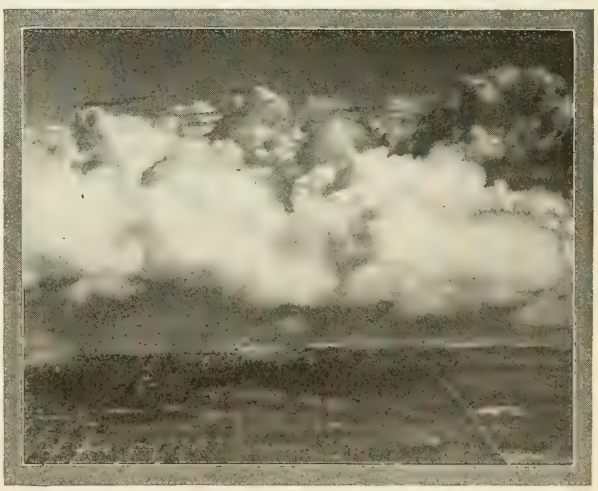
It has been found that these "troughs" of low barometer, or "saddle-effects," frequently form over the great Appalachian range of mountains, seeming to hang there for a day or two at a time.

But a trough of low pressure over the Middle West extending, let us say, from Illinois southwest to Texas will, of itself, give rise to very dangerous thunderstorms of the line-squall type and even tornadoes, the latter especially in late spring and in early summer in those sections.

Over the Appalachian Mountain region a trough of low pressure produces a long line or front of steep southerly or southwest winds with very warm and humid weather over the East, while to the west of this trough there is usually another long line, or cold front, shoving downward from aloft and outward at the lower flying levels and at the surface. When this mass of cold finally succeeds in climbing this range of mountains, the adjacent Piedmont sections are due for the usual afternoon series of line-thunderstorms and squalls.

We ought not to overlook the milder types of thunderstorms or line-squalls which are not quite as treacherous. On very hot days with the rising heat currents, even though our pressure may be between 30.00 and 30.10 inches, we occasionally have widely scattered local thundershowers. When no definite low pressure area is close to us, they become desultory and shift first in one direction and then another.

This is true also of the milder type of line-squalls, or wind-shift lines in the cooler months, that are caused through the overturning of warm currents of air by the cold rush from aloft. They may give an airplane a good bouncing up and down and side to side, and usually are accompanied by a good shower, but have not the same severe characteristics as their relations of the heated periods.

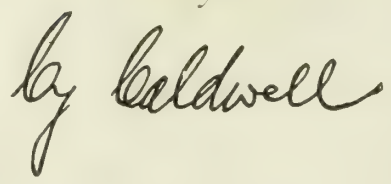


Courtesy of Fairchild Aerial Surveys, Inc.

Cumulus clouds forming into a summer thunderstorm

THE CUCKOO CLUB

By



YOU six readers will doubtless recall the Crash of the Month Club, the formation of which I chronicled in a recent issue of this great aeronautical encyclopedia. The purpose of that club, you remember, was to award a prize to the pilot accomplishing the outstanding crash of each month. The idea back of this was gradually to erase the 1929 surplus airplanes, to make room in the hangars for the 1930 models, in case they didn't sell very well either.

Truly, this was a worthy cause, as every distributor with unsold airplanes parked out under trees will agree. And it is gratifying to be able to report that many pilots have rallied nobly to the Cause. Four and seven-tenths per cent of 1929's surplus production already has been reduced to its constituent elements, instantly and completely. No waiting, on the part of hard-working members, for airplanes to fall apart gradually, through wear and tear. We *bust* them apart. Nor is there any indication that the good work will cease, through lack of interest.

Only the other day, for instance, I watched a devoted member of our club show a small foreign flying boat where it got off. This nice little boat had been imported from France—as though we didn't have enough nice little aircraft of our own that we couldn't get rid of! But this member of ours showed that boat what was what, and finally slapped it against the Atlantic Ocean, which has an especially rough surface in the vicinity of Long Beach, where I make my summer home.

I happened to be wandering along with a friend when I noticed this little boat being put through the hurdles. The pilot dived at the beach, zoomed up in a climbing turn, kept on zooming until he had used up all the zoom, then sort of cartwheeled down toward the earth or water, getting up speed in the dive, and scooting along the beach and hopping over the houses with glad abandon. Then up and up in another zoom.

What he really needed in that boat was a spare zoom or the multiple-zooming device invented by the Great Behncke. By this device you zoom up until the plane becomes practically zoomless, upon which you pull a lever, bringing the multiple-zoomer into play and affording the ambitious pilot zoom after zoom until the zooming doo-hickey or the pilot's patience is exhausted.

However, as the Great Behncke has not yet put this device into production, I presumed that the pilot whose antics I was watching was not equipped with the multiple-zoomer. So I said to the friend, with whom I was watching this daring display, "You know, I have a feeling that I should leap up, the next time that boat goes by, and hand the pilot one of the Safety Bulletins that I have been writing. If ever a pilot needed a few remarks on safety, there he flies."

Well, this exhibition went on for half an hour or so, the pilot diving at the beach or the houses, pulling up in climbing turns, and falling out of stalled turns. Once, in the little bay between Long Beach and Island Park, I believe he miscalculated his dive, for he came down very steeply, leveling off only at the last few seconds. When he pulled out of that dive—and he yanked it out, at that—he was not a yard above the water. You'd have thought that would have cooled him off. But it didn't. He flew over the ocean, motor full on, pulled up in a steep climb, turned at the top, and dived for the sea.

That was the last I saw of him, for some houses hid the beach from my view. But as he didn't come up again, I said to my friend, "He has landed or he has dived in, I don't know which. Either is quite possible. But now that he's down, I hope he stays down." He did. They fished his body out two days later.

I merely relate that incident to show you the sort of fellows we Crash of the Month Club pilots are. We fear nothing, feel nothing, and hit something. The newspapers reported that "the machine was seen to writhe in the air." Whatever that means—I find it hard to picture an airplane "writhing," but perhaps it was simply trying to shake off the pilot and land safely by itself. However, the paper said it writhed and fell into the sea. There was some question as to whether or not something fell off the plane. But if it did, I wouldn't be surprised. The way our member yanked that plane out of the dive I saw would have constituted a pretty severe test on the wings of a Boeing fighter—and this was only a little commercial flying boat. I guess what fell off was the safety factor. That made the center of gravity change places with the height of absurdity, and there you are.

A most distressing difficulty confronts the club. The wear and tear on the members is terrific. Despite all our research, we find it almost impossible to take an airplane apart in one fell swoop without coming apart ourselves. The sad point is that our members depart before they have paid their dues. They didn't tell us they were eligible for membership until we learned through the newspapers that they had been striving to join us.

Well, I think we've solved that difficulty. I am announcing herewith and without further preamble the CUCKOO CLUB, a club that is bound to become world famous. It's the runner-up for the Crash of the Month Club. In fact, it's practically impossible to win the grand prize of the latter organization unless you were previously a member of the Cuckoo Club. The idea is to collect enough in dues from each member of the Cuckoo Club to pay for his floral piece when he joins the Crash Club.

But let me digress for a moment while I explain why this Cuckoo Club has become a necessity in American Commercial Aviation, which is supposed to sell a man aerial transportation from here to there and return, without any extra holes punched in his carcass and without parts of him knocked off. The commercial operators have been complaining that we wild and woolly pilots who fly either for the sport of the thing or to impress our friends with our amazing bravery have dealt real commercial aviation a severe blow by dying more violently than we really have to. In fact, they state that there's no real need for us to bump ourselves off in airplanes, for, they claim, airplanes are reasonably safe if properly flown.

That may be, but what, I ask indignantly, is the fun of flying an airplane safely? One might as well be working for a passenger airline—allowing that it runs only in good weather. The thing we really brave fellows of the air love to do is to Defy Death, and tell our girls about it—or, better still, show them. Then, after we've landed—allowing that we've landed all in one unit and don't need to be bandaged up, or anything—what we yearn to do is to step negligently out of the plane (*Continued on page 226*)

THE ECONOMICS of the METALCLAD AIRSHIP

By Carl B. Fritsche

Vice President of the Detroit Aircraft Corporation

IN discussing the commercial utilization of the Metalclad airship, it is possible to do so only by comparing its performance with something with which the general public already has an intimate acquaintanceship. Therefore, the flying boat is used as a "yard stick" in defining the utility of dirigibles.

It is clearly realized that both the large flying boat and the large airplane possess practical advantages on shorter routes over which it would not be economical for large airships to operate. Consequently, this comparison should not be interpreted as an attempt to discourage the development of heavier-than-air craft, but rather to designate the range of activity in which they can operate most efficiently.

After you finish this story you will, I believe, agree that the conquest of the Atlantic and Pacific Ocean by commercial aircraft, lies within the province of large dirigibles more than in that of airplanes or flying boats. With the airship's large weight carrying capacity, its safety, its increasing speed, its long cruising range, its improvement in efficiency with size, its comparative economy of operation, and its flexibility of course, it would seem no idle prophecy to visualize a network of airship lines encircling the globe, supplementing our present land and water transport facilities, and penetrating the more remote regions of the world now little known to civilized man. The economy of this service alone will dictate its accomplishment. Think of the fuel cost per passenger of only $20 for crossing the Atlantic in a super-airship, and the fuel cost per passenger of only $5 for flying from New York to Chicago, or a little more than that for touring in the average automobile. The commercial airplane and the flying boat have both demonstrated their useful field of activity, but until much greater progress is made in their design and motive power, I believe that their radius of economic operation is limited to between 500 and 800 miles respectively. On the other hand, the modern airship possesses a radius of economic operation which exceeds the width of the Atlantic or Pacific in distance. For example, let us compare the performance of the fifty-seven-ton flying boat, which is now the largest flying boat in the world, with that of a 100-ton airship on a mail route between California and Hawaii, a distance of 2,540 statute miles.



A model of the proposed 100-ton Metalclad airship

In the light of present developments, the flying boat (in a non-stop flight) would be able to transport about 1,000 pounds of mail, whereas the airship could transport 16,000 pounds.

The power of requirement for the flying boat would be about 6,000 horsepower and for the airship 4,800 horsepower. Flying non-stop in still air the flying boat's fuel cost per pound for mail transported would be about $1.85; in the airship, it would be only $0.13 for the entire distance. Further examination reveals that the payload in the flying boat would be only two and two-thirds ounces for each nine horsepower as compared to fifty-three ounces in the airship.

Why this advantage in favor of the airship? Because searching and investigation by leading scientists and qualified engineers proves conclusively that there are inherent limitations in the performance of heavier-than-air craft. It is a matter of common knowledge in engineering circles that the efficiency of an airship increases very rapidly with the increase in volume, whereas in heavier-than-air craft there is little increase in efficiency with size, and in extremely large sizes there may be an actual decrease.

It is realized that the cost of fuel represents in itself only a small portion of the cost of operation. For the purpose of simple comparison, however, fuel cost is a vital consideration for the reason that it is a direct index of the cost of power plant operation, maintenance, replacement and depreciation, which collectively, in long-range transport, represent at least fifty per cent of all operating charges.

The 100-ton airship discussed in the above comparison would have a displacement of only 3,800,000 cubic feet, which is small as airships go. On the other hand, the fifty-seven-ton flying boat, according to some authorities, seems to approach the economic limit in size, with little hope for improvement in performance except by resorting to the very questionable expedient of increasing the wing loading, which in turn increases the landing speed and thereby reduces the operating safety factor. Any improvement in the use of fuel or in the thermal efficiency of engines would, of course, be of value, but this same improvement would aid the rigid airship also.

Consider also that the field of safe activity of the airplane is limited to land and of the flying boat to water. The airship, however, is not limited by either land or sea in its operation, and any large industrial center, no matter how far inland, may become a seaport, so to speak, and be connected directly with some other large industrial center that is inland in some other country.

Having completed the world's first successful all-metal airship, the ZMC-2 for the United States Navy, the engineering department of Detroit Aircraft is now engaged in the detailed design of a 100-ton Metalclad dirigible adaptable for both commercial and military uses. Commercially, a ship of this size would not be large enough for operation across the Atlantic to Europe, but it would be practicable for operation on the shorter route from California to Hawaii. A ship of this size would also readily adapt itself to operation over the natural trade routes between the Atlantic Seaboard and the West Coast, to the Panama Canal and South America, and from the mainland to such islands as Bermuda and Cuba.

From the standpoint of operation, it is interesting to compare in dollars and cents, and in payload carried, this proposed 100-ton commercial (*Continued on page* 214)

CAIRO-BAGHDAD AIR MAIL ROUTE

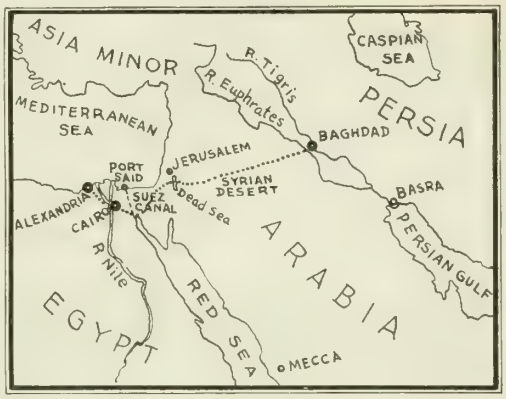
How the British Royal Air Force Inaugurated a Desert Airline

By Leslie S. Potter

Captain, Royal Air Force

THE opening of a desert air route between Cairo and Baghdad was definitely decided on at a conference held in Cairo in March, 1921, when the British Secretary of State for the Colonies, the Chief of the Air Staff, and the local British Army and Air Force commanders met at Cairo for discussions prior to the inauguration of the Middle East Department of the Colonial Office.

This airline was originally inaugurated and for a number of years operated by the Royal Air Force, but it has since been taken over by Imperial Airways. Although the route is now operating under commercial auspices, the problems involved in getting it under way were dealt with by the Royal Air Force. It is with those difficulties, as well as the plan evolved for operating the line, that we are concerned in this article.



Map of the Near East showing the route flown by the Vickers planes of the R. A. F. in carrying mail between Baghdad, Cairo and Alexandria

As projected, it was intended that the route should provide:

1. A link in the chain of communications between Europe and India and later Australia.
2. A line of rapid reinforcement from Egypt or Palestine to Iraq, both for aircraft and personnel.
3. A means of rapid communication by means of a regular air mail service.
4. A form of training in long-distance flying.

Some time previous to this, the regular crossing of the desert between Baghdad and Beyrout by means of automobiles had been started by the Nairn Transport Company, which used for the purpose Cadillac and Hudson cars that accomplished the journey of approximately 600 miles in thirty-six to forty-eight hours. Because of the considerable state of unrest existing in the country at that time among wandering tribes, principally Bedouins, these journeys were always frought with some hazard, and numerous incidents occurred of shootings, robberies and murders, in spite of the fact that the route up to the Iraq border was patrolled continuously by armored cars of the Royal Air Force. A large portion of this route lay, however, through Syria, which was under French jurisdiction, so that the responsibility for it all could not be undertaken by the British authorities.

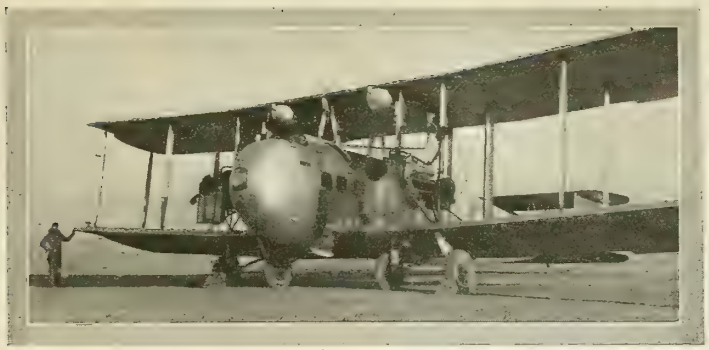
After it had been decided to open an air route across this territory, survey parties were sent out from Cairo on the one side and Baghdad on the other to render the track as conspicuous as possible; the wheel marks of heavy Crossley and Rolls-Royce desert trucks were employed. A large portion of the route lay across what is commonly styled the Syrian Desert on maps, though only a small part of this surface has a truly desert character. It ought rather to be described as a steppe, for even in the very heart of it during certain periods of the year, mainly February and March, there are immense tracts of grazing grounds for camels and sheep, although there are some long stretches of volcanic rock beds that are permanently bare of all signs of life and vegetation.

A remarkable feature of the Syrian Desert, especially in the basaltic region, is the presence of extensive mud flats. These flats occupy very shallow depressions and are the result of evaporation of drainage-water loaded with sand and fine yellow-reddish mud which collects in the depressions after rains. They are often several miles across, with a perfectly flat surface, and when thoroughly dry, are excellent for car traveling and provide good landing grounds. They have also the great merit to pilots of being very conspicuous from the air because of their sharp color contrasts with the surrounding country. During the summer, however, they are apt to change their shapes as a result of the rapid drying of the ground due to the intense heat. Moreover, cloud reflections on the ground often give impressions similar to the mud flats, and in the rainy season when the mud assumes a darker color they are unsafe for any form of transport.



The Sphinx—the air route from Cairo to Alexandria passes close to this monument of an ancient civilization.

The track was made from Amman, the capital of Trans-Jordania, to Baghdad, and circles were described about every twenty miles along the track and either numbered or lettered. Most of these have, of course, long since been obliterated by sand storms,



A forced landing near the Dead Sea. The author, who was pilot on this trip, is running up the engines after repairing the trouble which caused the landing. The plane is on a spit 1300 feet below sea level, surrounded by hills which rise 3500 feet above sea level.

but at the time they were of immense value to pilots inaugurating the route.

Two gasoline tanks were sunk near two distinctive mud flats for emergency purposes; one was at a place known as "D" on the route and the other at a place known as "V." The latter was 179 miles straight course from Baghdad, and the former 457 miles. Each tank held more than 600 gallons, and was opened by means of a special spanner device carried in each machine. Inside the tanks were the necessary pumps and tubing for operating them. Strangely enough, in spite of the fact that the presence of these tanks was known to wandering tribes and many attempts were made to loot them, no damage was ever done.

The character of the country changes considerably over its route, from the intense cultivations of Egypt to the sandy wastes of Palestine, from the mountainous regions of Trans-Jordania to the complete barrenness of the Syrian Desert. The highest elevation on the topography reaches 3,350 feet above and the lowest, at the Dead Sea, 1,300 feet below sea level.

Originally single-engined DeHavilland 9-A airplanes with 400-horsepower Liberty motors were used, but only for a short period. After a time Vickers Vimy, Vickers Vernon and later Vickers Victoria planes were adopted exclusively. Although the mails were mostly landed at Cairo, they were sometimes taken on 180 miles farther to Alexandria.

All ships carried seven and a half hours' fuel, but because of the intense heat—the temperature was often higher than 120 degrees Fahrenheit in the shade—it was impossible to carry anything like the full load. With the Vickers Victoria planes which were powered with two 500-horsepower engines, two pilots, one mechanic, one radio operator, six passengers and as much as 500 pounds of mail were carried. Any amount up to fifty pounds of luggage was allowed each passenger.

It was originally planned to make one halt at Amman, where there was a permanent Royal Air Force base, but inasmuch as this place was more than 2,000 feet above sea level and closely surrounded by hills with their resultant down currents, it was found dangerous to attempt to take off with any heavily loaded ship except in the very early morning. Accordingly, a new refueling base, some sixty miles east, was established at Zisa. A small single-track railway ran there from Amman. Originally built by the Turks for military purposes, it was captured during the war and kept by the Hedjaz, for whom it is now known as the Hedjaz Railway. The rolling stock consists, I believe, of one engine and a few coaches. When the train sets off once a week from Amman, sufficient water has to be taken for the engine to get it back again.

The water question on this route was always acute, and two gallons of water per person was regularly carried on all the planes. Numerous engine and plane spare parts, which would normally never be carried, were also considered necessary, as were also a radio mast and hand generator for use in sending messages in case of a forced landing. The distance from Baghdad to Zisa was 543 miles, and from Zisa to Cairo, 383 miles.

It was not always possible to make the single hop from Baghdad to Zisa with any degree of safety because of retarding winds, and sometimes use had to be made of the emergency tanks. Nevertheless, the trip was generally done in a day of about ten flying hours, although sometimes as many as twelve or thirteen hours were required; but the fleshspots of Egypt were always greatly appreciated by the Royal Air Force personnel, which otherwise was dependent on the vaguer dissipations of Baghdad for its recreation.

In January, 1927, the mail service was taken over by Imperial Airways flying DeHavilland Hercules trimotored (Jupiter engines) planes, which operated this route for the first twelve months with 100 per cent efficiency.

The Cairo-Baghdad service was extended to Basra in December, 1926, and Imperial Airways, Ltd., maintained a regular fortnightly schedule of operation until April, 1927, when a regular weekly service was established. During the following year of operation, forty-five flights between Cairo and Basra and forty-four return flights were completed. The total amount of mail carried during this period was 32,122 pounds. During 1928, sixty-one per cent of the capacity of planes operated by Imperial in the Near East was filled and 99.37 per cent of scheduled services were completed.

The line was extended from Basra to Karachi during the first week of April, 1929, as a part if the weekly England-to-India air route. A passenger, mail and express air transport service from London to Karachi was inaugurated, bringing India within six days, five and three-quarter hours of London.

Landplanes, railroad facilities and flying boats are utilized. A trimotor landplane is used on the first hop from London to Basle, where a transfer is made to the night sleeping car express to Genoa. A fleet of all-metal flying boats are used between Genoa and Egypt. These planes were especially built for this service. From Egypt (via Cairo, Baghdad and Basra) to Karachi trimotor ships operated on the Cairo-Baghdad-Basra route for two years have been used.



Natives of Trans-Jordania gathered about an R. A. F. mail plane during its regular stop at Zisa, a fueling base on the Cairo-Baghdad route.

THE FASCINATION OF FLIGHT

Don Rose

AMONG the many good reasons for traveling by air, it sometimes seems to me that the best gets a singularly poor break. Some of the others, by the same token, are overplayed, so that the patient public listens with its tongue in its cheek and decides at last to walk.

I am beginning seriously to doubt the sales power of speed as an argument in favor of flying. It is based on the supposition that we are all in an equally ungodly hurry to go places and that the time we save in transportation will somehow be put away to our credit in the bank balances of eternity. It implies that unless we are always rushing our fool heads off we shall never catch success by the tail. It suggests that we all use our time so wisely and well that we can't spare a moment of it.

There are, of course, people like that—heaven help them—but there aren't enough to keep a national industry in customers. Many of them, for that matter, are a serious nuisance, a public danger and a menace to the better moods of civilization. Many of them are just now making the highways hideous by careening along them on four wheels and the grace of God, in a desperate hurry to get nowhere in particular. It's a safe five-to-one shot that when you see an automobile breaking all local traffic rules and safety regulations, its driver is either a restless ass showing off to the girl friend or a business man hurrying to save time which he won't know what to do with when he has saved it.

There was a curious case last summer, with a moral which most of us missed. A gentleman whose name now escapes me made a quick jump across the continent by train and plane, caught the *Graf Zeppelin* by an eyelash, and arrived in London a week ahead of every other transportation possibility. Nobody knows what he did with the week when he had it; nobody even asked. But very likely he spent it in wandering around, waiting for the world to catch up to him.

I may be in this mood because I'm getting old and feeble and because the weather is so hideously hot that I couldn't hurry out of the way of a ten-ton truck. It may be that I'm soured on speed from overstudying the accident record on our hurried highways, where a million were hurt and 31,000 killed in 1929,—a record which makes the hazard of aviation hang its head in shame. But anyway I recall very clearly the story of the old Indian, to whom a white man protested that he had no time for something or other. "Well," said the Indian, "I suppose you have all there is."

The time we save by speed is usually dearly bought. We pay for it in hardening of the arteries, nervous prostration, swollen tonsils and excess work and worry. And therefore, when anyone tells me that by taking a plane I can get somewhere an hour and twenty minutes earlier than in any other fashion, I ask him what I shall do with the hour and twenty minutes. And nine times out of ten he can't tell me.

There are, of course, all sorts of exceptions to this reactionary pessimism. I was just yesterday to a polo game at Chester, Pennsylvania, polo being a game in which the players get the credit and the horses do the work. The game was a little slow in starting and while we waited and fried in the sun, a plane came skimming over the trees, circled the field a couple of times, and landed in the neighborhood. The announcer thereupon informed us that two of the Princeton team had set out from New Jersey, got into an automobile smash, and would have missed the game if they had not been able to pick up a plane and come to Chester by the straight line which is the shortest distance between two points unless somebody has been kidding us. There, possibly, was a case in which a hundred miles an hour turned out to be useful, if not essential. There are probably many others.

But selling airplane service because it is fast makes it necessary for the salesman to carry a double-barrelled shotgun of argument. First he must argue and demonstrate that the airplane can get the customer where he wants to go in the shortest possible time, which isn't always as easy as it looks. It would take me, for instance, at least twice as long to get from my own front porch to Grand Central Terminal in New York by airplane as it would by Pullman. Under certain circumstances of wind and weather. the airplane makes out as badly against other modes of transportation as the hare did against the tortoise. And there are innumerable times and conditions when an airplane is about as useful to the man in search of business or pleasure as the milk train to the average commuter. So long as the railroads are running Pullman cars, an overnight journey by train will cover a lot of territory and still get you there in time to say "good morning" to your customer's blonde secretary before her nose needs its second coat of powder.

So when the salesman has proved that the plane can save time, he must persuade the passenger that he needs to save it. In emergencies and exceptional cases he does; the rest of the time it's a tough argument.

So I urge and entreat the brethren to let the speed of the airplane speak for itself, and concentrate their talents on selling something of wider and more general appeal. The commodity which most needs to be sold to the public today is the fascination of flying. It must be sold as a novel experience which never grows stale, a privilege which is now within everyone's reach, and a delightful addition to the diversions which make both work and play worth while. Aviation has a monopoly of it, and the well-behaved airplane never fails to deliver the goods according to specifications. The fascination of flight is the best argument for flying, and makes most of the others superfluous.

On this point I speak from some experience. I know very little about piloting a plane, aerial navigation, stunt flying and plain and fancy parachute jumping. If my favorite pilot should happen to drop dead while riding me around the sky, I should just be stuck there until somebody came up to get me down. I also do practically no back-seat driving of airplanes, and confine my concern in the air to the hope that the pilot cares as much about his own continued existence as I do about mine. In any case, I am quite sure that nothing I can suggest will be of any real help to him.

So I am perfectly free to enjoy the sensation of flying, having practically nothing else on my mind. By courtesy and kindness of numerous flying men, I have roamed rather freely in the upper air, both for long distances and little ones. I have tried several sorts of plane, pilot, weather and altitude. I have looked down on cities and open fields, on sea and forest, on stadiums, cemeteries, building lots and back yards. I'm not tired of it yet, nor likely to be.

I know very few confirmed air addicts who are. An excellent friend in the business who has flown his hundreds of thousands miles still stretches his neck like a novice which he goes about in (*Continued on page* 190)

BLIND FLYING AND RADIO (Part 1)

By

Herbert Hooner Jr.

Radio Technician, Western Air Express

THERE are a few subjects that are as widely discussed and acrimoniously argued among people actively interested in aviation as "blind flying." It seems to be generally agreed that, if our transport systems are to maintain their rapid pace in improving the art of flying, they must sooner or later tackle this problem in an intensive way. It is natural that the transport companies should be the ones most interested—with the possible exception of the Army and Navy—because they are in the business of providing a regularly scheduled service. The individual flier who is in the air primarily for pleasure can postpone his trip or turn back if the weather does not look promising, but the transport companies are selling transportation in competition with other established carriers, such as railroads, steamships and buses. If we are to compete successfully for passenger, mail or express business, we must offer the same comfort, regularity of service and safety as would be expected of any other mode of travel, whether on land or sea.

In other words, if a man in New York decides one morning that he wants to go to Chicago, he will go by train unless he has every reason to believe that an airplane will get him there according to schedule. A plane may be able to complete the trip, under favorable weather conditions, in one-half or one-third the time that is required by railroad, but unless the air transport companies can eventually achieve the reputation of consistently maintaining their schedules under practically all conditions, then the fullest development of air transportation will never be attained.

If this standard of service is to be reached, it is obvious that a considerable amount of flying will have to be done under conditions of low visibility. The discussion that follows is intended only to be a brief analysis of some of the more important factors that enter into low visibility flying, pointing out in a general way the facilities that are available at present, and those which are needed, but not yet developed. *This is not an attempt to promote more blind flying with the equipment that is now in use, but merely to stress the need of more research and experimentation by government agencies, the transport companies and interested manufacturers.*

Before starting on the discussion, it is needless to point out that there are many other problems which must be solved before blind flying instruments can eventually be put to use. Among the most important of these is the development of airplanes and power plants that are sufficiently reliable to justify pilots in undertaking such flights without fear of forced landings resulting from mechanical breakdowns. Furthermore, a far more extensive and complete weather reporting service than now exists should be made available to the transport operators. Another primary requirement on many of the airways in the United States is the closer spacing of adequate intermediate landing fields, together with better facilities on them for night landings, especially in regard to the larger types of aircraft. The final solution of these and other problems can only be determined by experience and gradual development in the art of air transportation, but, nevertheless, they should be kept firmly in mind when blind flying is discussed.

This article is concerned, however, only with the actual navigating problems that would arise if all other conditions made blind flying generally permissible. Inasmuch as we are particularly interested with radio in this series of articles, special attention will be given to that phase of the subject.

When flying under conditions of low visibility, the problems of navigation can be classified into three groups:

First, exact and up-to-date weather information must be constantly available to the airplane. This should include advice from competent ground observers as to the most suitable route to follow, landing conditions at all airports in the vicinity of the plane, cloud formations, wind velocities at various altitudes, and any other pertinent information which may be desired.

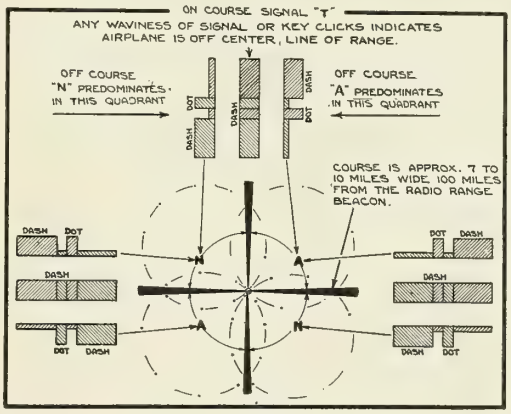


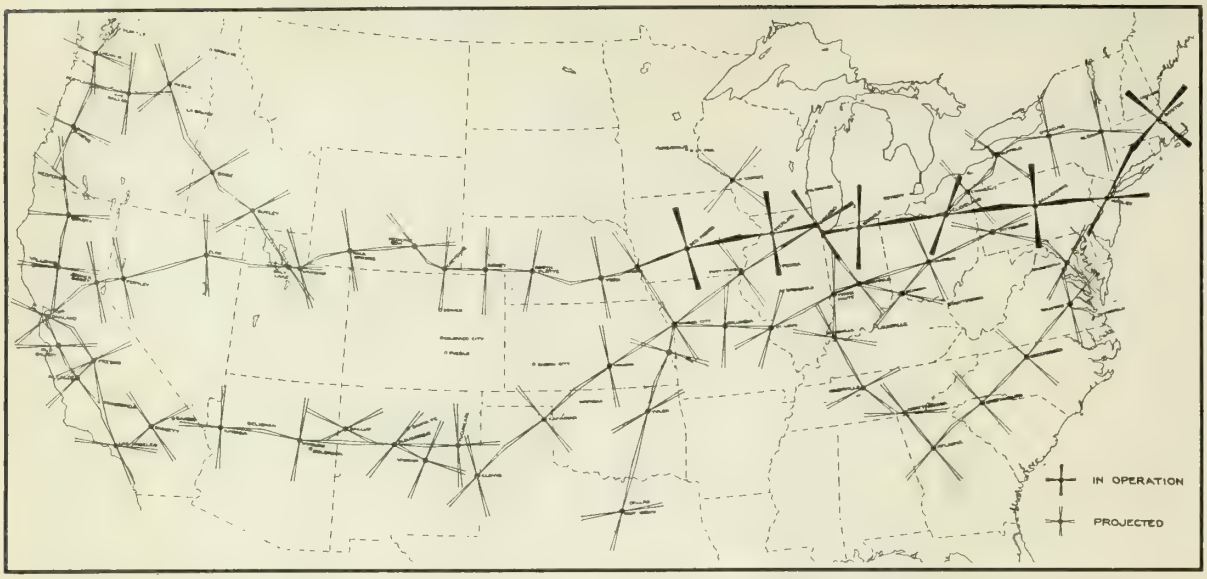
Diagram 1 showing radio signals marking airway courses. For uniformity and purposes of orientation, quadrants north or northwest have "N" (dash-dot) signals For identification, signals are transmitted in groups of one to twelve signals and in the same manner that a clock tolls time, the station may be identified by counting the number of signals per group.

Second, the pilot should know his exact geographical location and altitude above the ground at all times, together with the general direction of his flight, amount of drift, etc. This can be called his "geographical position."

Third, the pilot should know (a) the instantaneous position of his plane with regard to the true horizon (whether his wings are parallel or at an angle with respect to the surface of the earth beneath him, and whether he is climbing or descending), and (b) the direction in which the plane is flying. This can be called his "flying position" in contrast to the geographical position as defined in the previous paragraph.

In analyzing each of these groups of problems, the first step is to determine what information is ultimately to be desired, then to examine the instruments and methods that are available at the present time, and finally to point out what further developments or inventions seem to be necessary in the future.

The first problem in regard to weather information has been largely solved by the radio telephone. The Department of Commerce is broadcasting weather reports at fifteen-minute intervals, covering many of the major airways of the country. These broadcasts are made on long waves, and may be heard by any properly equipped airplane within a radius of 150 to 200 miles. In addition to this, the larger transport companies are maintaining their own networks of short-wave radio telephone stations to



Map prepared by the Department of Commerce Airways Division, showing stations of the radio range beacon system

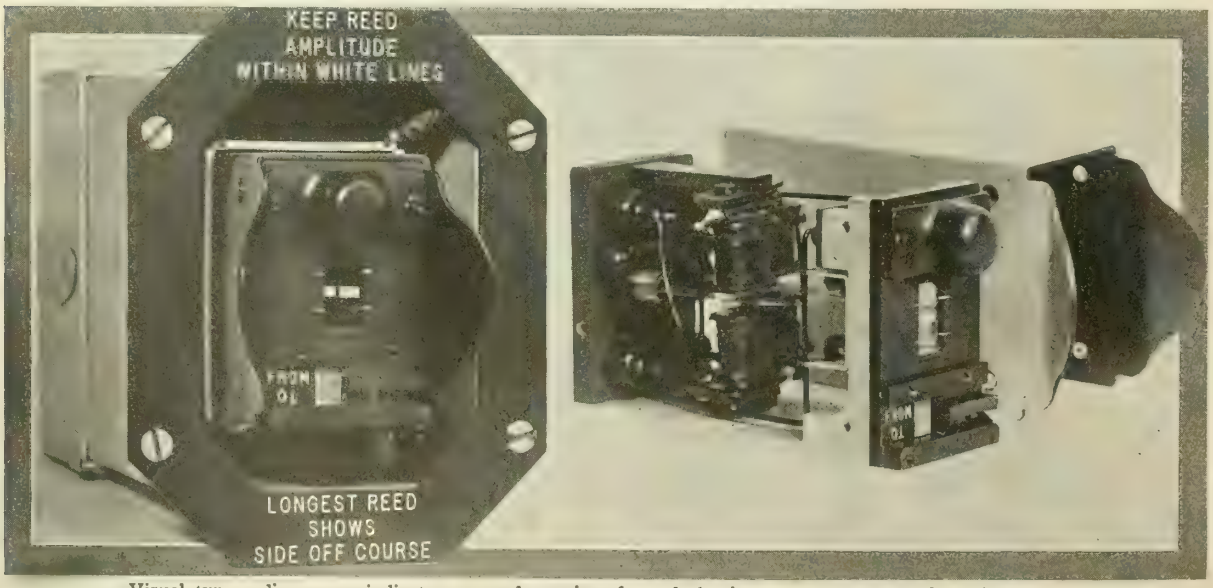
carry on two-way communication with planes while in flight. Further details of this work will not be given here because a full description has already appeared in previous articles of this series.

There is one point that should be stressed, however, in regard to the transmission of weather information to an airplane while it is in flight. *The value of the information that a pilot receives from a radio station on the ground depends almost entirely upon the number of weather observers that the station is able to draw upon, together with the accuracy, fullness and reliability of the reports that they submit.* An airport radio station is of little value for meteorological purposes unless it is made an integral part of a comprehensive weather reporting system. It therefore appears obvious that before low visibility flying is generally indulged in, a much more complete weather reporting service will have to be built up, and that the accuracy and speed of collecting and disseminating these reports will have to be improved.

In regard to the second group of problems outlined above—namely, the geographical position of the airplane in flight—the development of suitable methods has progressed satisfactorily, but as yet there are a number of devices which are still badly needed. A pilot should know: (a) whether he is exactly on the airway, and if not, to which side he should turn in order to correct his course; (b) how far he has progressed along the airway; and (c) how far he is above ground.

The Department of Commerce has installed the radio range beacon by which a pilot can tell when he is on the airway, or to the right or left of it. There are two sorts of beacons now in use—the aural and visual types. The aural type is most generally used and its action can most easily be explained by Diagram 1. When the plane is exactly on the airway, a long dash is heard in the head phones; whereas if it is to the right of the course, a "dash-dot" is heard, and if it is to the left, a "dot-dash" is heard.

The action of the visual type is somewhat similar, except



Visual type radio course indicator as used on aircraft, and the instrument removed from its case

that instead of listening for signals in the head phones, there is a small indicator on the dash board which gives the same information. Two metallic reeds, with their ends painted luminously, are mounted behind a small glass window. When the plane is exactly on the airway, both reeds vibrate the same amount, while if the plane is off course, one will vibrate more than the other. The relative difference between the reed amplitudes shows the distance away from the center line of the airway—the shortest reed indicating the side to which the pilot should fly in order to retain his course. In operation, the reed indicator system is surprisingly accurate and easy to fly with.

Although the radio range beacon indicates with considerable accuracy whether or not a plane is on the airway, it does not show how far it has progressed along its course. Something is greatly needed to fill this gap in the otherwise admirable system that the Department of Commerce has installed.

One possibility is to place a small radio marker beacon on each of the airways lights, which are now spaced about ten miles apart. A distinctive "buzz" in the headphones (or an indicating instrument if the visual beacon were used) would inform the pilot with considerable accuracy his exact position on the airway.

The signal from the radio marker beacon should be very strong in the neighborhood of the beacon light, but at the same time, it should not spread out along the airway so as to be confused with other points in the same vicinity. The research work that is now being conducted on this problem is being concentrated on wave-lengths in the vicinity of five meters. At these ultra-high frequencies, it is possible to focus the radio waves in much the same manner as light waves are concentrated by a mirror, so that an intense but narrow beam is radiated.

This or some other similar device must be developed before blind flying can become generally accepted.

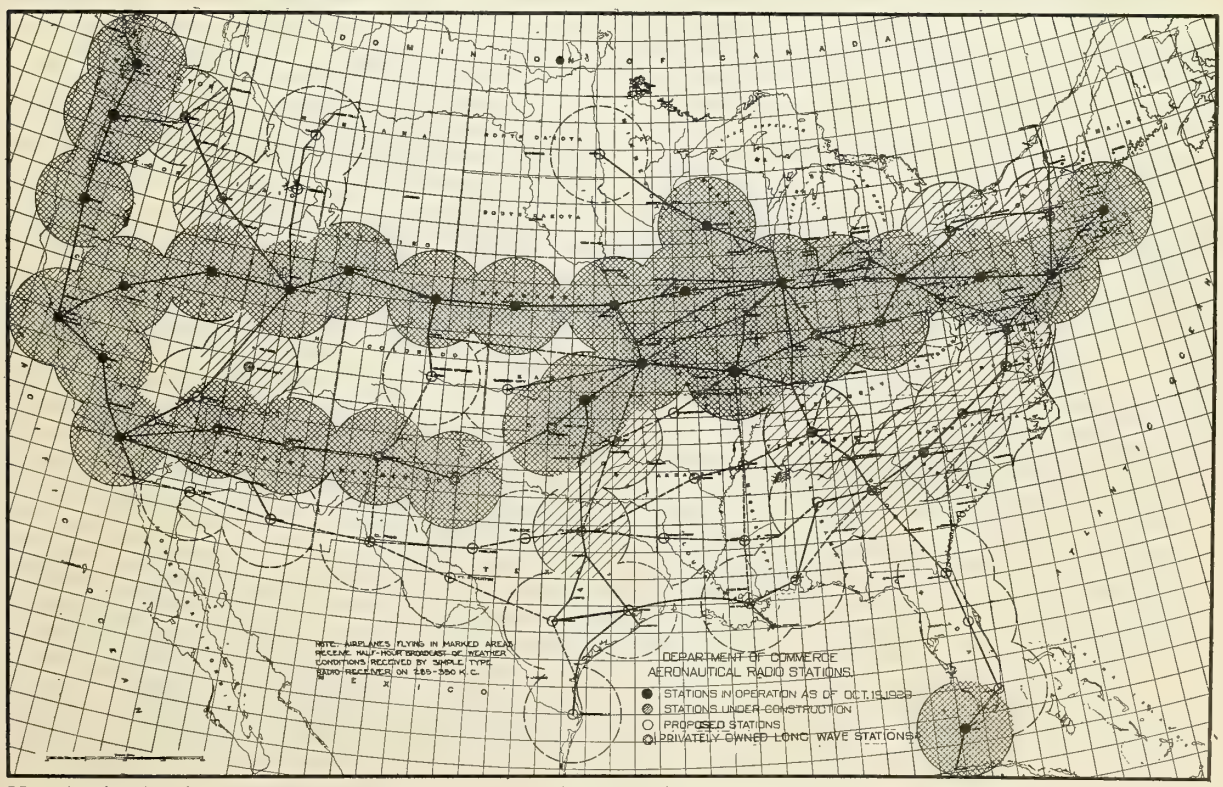
The next problem is to measure the actual altitude of the plane above the ground. At the present time no practical device exists for determining this distance. Research work is being undertaken by many agencies to perfect such an instrument, but the results so far have not been satisfactory.

Until such a device becomes available, a limited amount of blind flying might theoretically be undertaken in conjunction with a barometric altimeter, if it were done at a safe altitude. This would require, however, that the exact progress of the plane along the airway be known, so that sufficient clearance with the ground could always be maintained. In actual practice, it is doubtful if any conservative pilot would do this, except when flying in clear air, at considerable height over clouds or fog, and when it was definitely known that landing conditions were satisfactory at the destination.

To sum up the discussion thus far, it would appear that two major developments are needed before even a limited amount of blind flying can be generally undertaken. They are, first, a more comprehensive system of weather observers, both on and off the airways; and, second, a method of informing the pilot how far he has progressed along the airway. An above-ground altimeter would be necessary before anything approaching the usual conception of blind flying should be indulged in.

The third group of problems, namely those involving the flying position of the plane, its stability, and its instantaneous compass course, are the ones that are probably the most important from a blind flying point of view, and at the same time, they are the ones that are the farthest from solution.

The second part of this article, appearing in the August number of AERO DIGEST, will be devoted to a continuation of this subject.



Map showing location and range of aeronautical radio stations for voice broadcasting, operated by the Department of Commerce

EIGHT MILES HIGH

Robert B. Renfro

IF we may judge by the successful attempts during the first six months of 1930, this is America's year on the official ledger of the F. A. I. where world aircraft records are scored. Since January 1st our pilots have brought to the United States eleven world records which are entered as "official." Another, the most recent altitude trial of Capt. Boris Sergievsky in a load-carrying Sikorsky seaplane, is at this writing undergoing calibration at the Bureau of Standards before being homologated as a record.

These flights assume a greater meaning to the American aircraft industry when it is considered that they were accomplished in a wide variety of airplane types and under numerous conditions of loading, etc. They would seem to indicate that aircraft design and construction in this country are not only advancing steadily, but achieving all-'round superiority. This year more than ever before we have devoted our attention to significant rather than merely dramatic flights. As cases in point, consider the four records (one for speed and three for altitude) established by Captain Sergievsky in a Sikorsky amphibion (wheels removed) carrying various heavy loads; the six speed records for load-carrying landplanes over specified distances set by Lee Schoenhair in a Lockheed Vega; the light plane altitude record achieved by D. S. (Barney) Zimmerley in a Lambert-powered Barling NB-3; and the supreme altitude mark of 43,166 feet attained by Lieut. Apollo Soucek, U. S. N., in the Wright Apache, the Navy's high-altitude plane.



Lieut. Apollo Soucek, U.S.N., who flew to 43,166 feet

Lieutenant Soucek's flight, however, differs from the others in that it was not only important for the lessons learned in preparation for it, but spectacular by virtue of its superlative degree. By climbing to an altitude of more than eight miles, Lieutenant Soucek surpassed by 1,367 feet the world's record established last year by Willi Neuenhofen, a German, who flew a Junkers W.34 to 41,794 feet. Moreover, the Wright Apache biplane on this occasion exceeded even the unofficial record for all aircraft made by Capt. Hawthorne C. Gray, A. C., who rose in a balloon to 42,470 feet on November 4, 1927. Captain Gray died from exhaustion of his oxygen supply while descending to earth, but the barographs carried revealed the height he had reached.

On his attempt, Lieutenant Soucek took off from the Naval Air Station, Anacostia, D. C., on June 4, exactly one year after he had established a world seaplane altitude record of 38,560 feet. (On June 13, 1930, Soucek flew the seaplane to 39,140 feet, which was higher than his 1929 flight, but 76 feet short of a new record.) The seaplane flight last year, which was made in the same Wright Apache fitted with floats, is described in detail in Mr. H. B. Henrickson's article in this issue, as are the other altitude trials of 1929, preceding and leading up to those of the current year. Also, inasmuch as Mr. Henrickson explains thoroughly the method employed in calibrating barographs to determine the official status of such flights, I omit reference to that phase of Lieutenant Soucek's flight other than to mention that, although the cockpit altimeter registered only about 42,000 feet, the official mark proved to be 43,166 feet, and that the air pressure at the maximum height was 118 millimeters. It seems appropriate to add, too, that the temperature recorder used in computing the altitude was devised by Mr. Henrickson. This instrument, which is small, light and compact, consists of a temperature-sensitive unit operating a stylus which traces a line on a revolving disk smoked with lampblack. The entire device is no larger than the palm of a man's hand and is mounted on an interplane strut as far as possible from the propeller, so as not to be affected by the engine heat or the propeller blast. How this instrument is used in calibrating altitude Mr. Henrickson himself describes in his article.

The principal value of Lieutenant Soucek's flight is its contribution to military aeronautics. The Navy personnel at Anacostia has devoted more than a year's study to improving the performance of the ship in preparation for this attempt. No factor which might raise the ceiling of the plane was overlooked, not so much for the sake of the record itself as for the advancement of naval aviation.

To this end continual research, experimentation and flight-testing were necessary in developing equipment and a plane with an altitude performance such as that of the Wright Apache. The extreme cold at great heights imposes hardships on the pilot, as well as the plane. The recorder on the wing of Lieutenant Soucek's plane registered temperatures as low as eighty-nine degrees below zero, Fahrenheit. Yet Lieutenant Soucek reports that he did not suffer from the cold, partly because he was protected in the cockpit, where he received some heat from the engine, but principally because of the nature of the clothing he wore. His flying suit, which has been evolved from extensive experience in altitude flying, consists simply of one single fur-lined suit (no undergarment is worn), fur-lined boots, combined helmet and face mask, and mittens.

To overcome the hazard of moisture freezing on his goggles and obscuring his vision, Lieutenant Soucek, in collaboration with his brother, Lieut. Zeus Soucek, formerly of the Navy and now with the Eclipse Aviation Corporation, devised a pair of heated goggles. By means of an electric heating element wound across the lens and supplied with current by a small storage battery, the formation of frost was prevented, though moisture still collected on the lens. This condensation, however, is not as great a handicap in flying, because it remains unfrozen. Un-

(*Continued on page* 192)

ALTITUDE FLIGHTS DURING 1929

By H. B. Henrickson

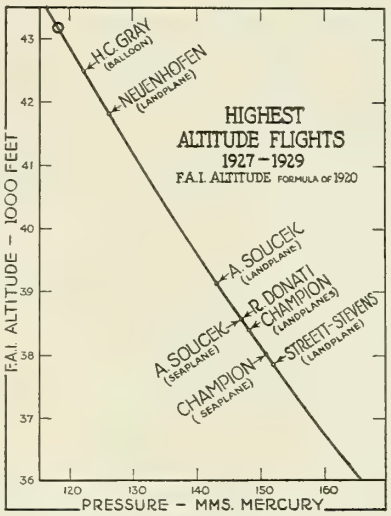
Aeronautic Instruments Section
National Bureau of Standards

DURING the year 1929 greater interest in altitude flying resulted in an increased number of record flights. Several such attempts, made in military planes with and without useful load, were successful in establishing new official marks. The year, aside from the outstanding performances of Lieut. Apollo Soucek of this country and Willi Neuenhofen of Germany, was especially noteworthy for the many flights which were made by commercial pilots in efforts to break the various altitude records. This trend continues during the present year (1930) since a number of such flights already have been made, with all indications that they will become more numerous as the year advances.

During the past year, keen rivalry has continued to exist among the women pilots, each naturally trying to better the performance of the others. Some of these contestants, no doubt, have been glad to note that the Fédération Aéronautique Internationale established in June, 1929, an official category for women's flight records. This action of the F. A. I. opens up a field of competition in which only a a few records are firmly established, and the number of contestants at present relatively small. As a result, it appears even at this early date, that a certain young aviatrix in this country is eager, and has a reasonable chance, to capture most of them.

One of the first flights of the year 1929 was made by Lieut. Carlton C. Champion, U. S. N., at that time the holder of the landplane and seaplane altitude records. This flight, as well as those made on former occasions, took place at the Naval Air Station, Anacostia, D. C., in the Wright Apache biplane, powered with a Pratt and Whitney Wasp equipped with a Root's type supercharger. The altitude attained, unfortunately, did not exceed the former record of 38,418 feet, because early in the climb some troubles developed. These were due to the loosening of the breathers on the gasoline tank, which resulted in a spray of gasoline over the ship; and to the overheating of the supercharger during the very rapid climb to about 10,000 feet, thus making it impossible to go higher. On landing, the pilot considered that it would be necessary to modify the ship somewhat, by moving its center of gravity backward a trifle, before he would attempt another altitude flight. The free-air temperature at the highest elevation was twenty degrees below zero Centigrade, being recorded by a small bimetal minimum-temperature recorder placed on the strut. This flight was the last in Lieutent Champion's series of altitude trials in the Navy's high altitude plane.

On April 17th, pilot Steindorf of Travemünde, Germany, made an altitude flight in a Rohrbach Romar flying boat equipped with three B. M. W. engines of 500 horsepower each. The flight was made with the object of carrying the greatest payload to an altitude of 2,000 meters.





Times-Wide World Photo

Lieut. C. C. Champion being assisted into his flying suit just before taking off on an altitude flight

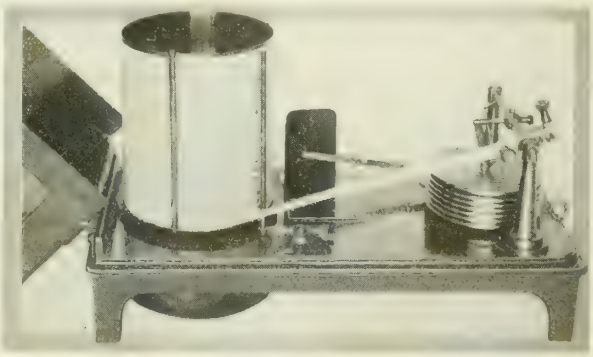
The trial was highly succcessful in establishing a new world's record—lifting, as it did, a payload of 6,450 kilos (14,200 pounds) to an altitude of 6,562 feet.

At this point it may be well to say a word or two about the testing of barographs used in altitude flights. The technique of testing such instruments has been described in some detail on page 885 of the May, 1928, issue of AERO DIGEST. Only one instrument of each flight is given official tests. If two instruments are carried in flight, one is arbitrarily designated as "official" and tested. The extra instrument is carried as a safeguard against failure of a single barograph. The official instrument is tested by subjecting it as nearly as possible to a repetition of the same temperature and rate of change of pressure as that experienced in flight. In short, the barograph is given a "flight-history" test. When the position of the stylus of the instrument is at the lowest pressure indicated by the flight trace on the smoked chart, the pressure in the bell-jar or test chamber is determined by reading a standard mercurial barometer. In accordance with the regulations of the Fédération Aéronautique Internationale, this pressure if observed to a fraction of a millimeter, is taken as the next higher whole millimeter of mercury—a wise provision in view of the fact that this is about the best accuracy obtainable with available barographs. Further, this pressure is then converted to altitude in meters (or feet) by means of the F. A. I. pressure-altitude relation adopted in 1920. It is of interest to note that the F. A. I. altitude is approximately 2.1 per cent lower at 30,000 feet than that indicated by an altimeter calibrated to the United States standard atmosphere. This, in part, is the cause of the higher reading of the altimeter at the highest altitude as compared with the altitude officially determined. The F. A. I. specifies that in order to break an existing world's altitude record it is necessary to exceed it by at least 100 meters (328 feet).

The Bureau of Standards has consistently adhered to the practice of determining the lowest pressure attained during a flight to an accuracy within one millimeter of mercury. To obtain this accuracy it is necessary among other things that the temperature of the instruments should be the same during the test as in the flight. Temperature control is not required by the F. A. I. regulations, permitting a reasonable interpretation that the instrument may be tested at room temperature (about +20°C). The error introduced by the lack of this requirement is usually large. Thus, for example, one instrument recently tested indicated 264 mm. of mercury (25,942 feet) when at +20°C, and 269 mm. of mercury (25,525 feet) when at —20°C, the latter being the temperature of the instrument at the highest altitude of the flight. Another instrument tested some time ago indicated 160 mm. of mercury (36,771 feet) at +20°C, and 152 mm. of mercury (37,854 feet) at —40°C, the latter being the correct value. It is evident that temperature control during testing is essential if an accuracy even approximating one millimeter of mercury is to be attained. The instrument's temperature can be estimated with fair accuracy if the air temperature at the ground level and the place of mounting of the instrument are furnished, together with the usual data. A more satisfactory method is to have the instrument's temperature recorded during the flight. This is now being done in many cases by means of a minimum-temperature-recording thermometer devised by the author. A bimetallic spiral is used, one end fastened to the barograph base and the other end carrying a stylus arm, the tip point of which records upon a flat, camphor-smoked aluminum plate.

Sometimes a shift in the adjustment takes place during the transportation of a barograph following a record flight and before the test is made. This results in a slight offset of the pen-arm, producing a change that is not easily noticed. In order to guard against this source of error it is merely necessary, in the case of the dual-traverse barographs, to note while pressure is being reduced under a bell-jar the action of the pen at the turn point of the flight trace. If the pen reverses at a lower or higher point than in this trace, then there has been a shift subsequent to the flight. As a further criterion, the pressure at the ground level as indicated on the flight trace may be checked for approximate agreement with Weather Bureau data observed at the time and place of the flight. In the case of the single-traverse barographs, of course, the latter criterion is the only one possible. In order to obtain dependable results from barographs, care must be exercised at every step from start to finish as regards the preparation, installation, transportation, and—last but not least—the testing of the instrument.

On May 5th, the late Edward J. Devereaux made an altitude trial at the municipal airport at Syracuse, New York, in a Curtiss Robin monoplane powered with a Curtiss OX-5 motor of ninety horsepower. The flight was attempted simply to determine the highest altitude attainable by the ship. The barograph used in the flight, on being calibrated at the Bureau of Standards, indicated a minimum pressure of 400 millimeters of mercury, which is equivalent to 4,990 meters, or 16,370 feet, using, as in all records the F. A. I. standard atmosphere.



Friez barograph with one-hour drum, the type usually used for altitude flights. Temperature-indicator is at the right

On April 19th, a new pilot relieved Lieutenant Champion from the high altitude flying experiments with the Wright Apache at the Anacostia Naval Air Station. This was Lieut. Apollo Soucek, U. S. N., who had been shown to have special physical aptitude for the work during rebreather tests.

On May 8th, Lieut. Soucek took off from the Anacostia Naval Air Station, in the Wright Apache landplane. The day was perfect for altitude flying because of the cloudless sky. The latter feature is of considerable importance in all high altitude attempts, since the location of the airport must be kept in view throughout the flight; otherwise, the pilot might find himself hopelessly lost when coming back to earth for a landing. During this flight I had the good fortune of being present. Just before the take-off, two dual-traverse barographs were sealed by Major Luke Christopher, secretary of the Contest Committee of the



Willford G. Moore



D. S. (Barney) Zimmerley

National Aeronautic Association. Following this procedure they were installed within the barograph compartment of the ship, each being carefully suspended by heavy rubber bands which minimize the effects of vibration. This compartment was located just behind the pilot's cockpit. In the compartment, were also mounted three metal flasks of compressed oxygen. Special precautions had been taken to insure that the oxygen was free from moisture, since if even a small amount were present it would freeze at the needle-valve outlet, stopping the flow. Two of the bottles were for service use, while the third was for a possible emergency. After we had started the clockworks of the barographs and opened the valves of the oxygen flasks, the compartment was securely closed. Some time later, after sufficiently warming up the motor, the pilot took off with forty gallons of gas. He climbed steadily and some time later the penetrating, high-pitched whine of the supercharger could be heard above all else. The plane circled upward, higher and higher into a clear sky until it was lost to sight. About a half-hour later, a rather long, narrow, but well defined streak of white "smoke" appeared in the eastern sky at an elevation of about forty degrees. The sign was hailed with delight, since it was an indication that the pilot was making good progress. The white streak observed was not really smoke, but simply frozen moisture that trailed from the exhausts of the engine. Such water, formed in the products of combustion, rapidly freezes in the upper atmosphere where the air temperature is approximately fifty degrees below zero Centigrade (—58°F). This snowy trail appeared pure white against a clear blue sky. The phenomenon continued about fifteen minutes with the lower half of the trail slowly shifting its position slightly. The plane itself, of course, at this extreme altitude was invisible, as observed by the unaided eye. Just forty-eight minutes after the take-off, the white trail in the sky suddenly disappeared. This was the tell-tale signal that the climb had ended, and that the plane was on its way back to the station. After what seemed to be a period of twenty minutes, the plane was detected—first by hearing the whine of the supercharger and then by seeing the plane itself which approached our position from high over Washington in the northern sky. At 12:24 p.m. the plane was landed safely, and not far from the very point of departure. The pilot then climbed out of the ship unaided—all as though it had been some customary flight. A detailed account of what happened aloft during the flight has been especially well described by Lieutenant Soucek on page 52 of the June, 1929, issue of AERO DIGEST. It would be superfluous to repeat here that part of the story. Except for well chilled hands and face, the pilot suffered no ill effects from his record-breaking flight which required a total time of one hour and fourteen minutes. An examination of the minimum-temperature-recording strut thermometer revealed that the lowest temperature (at ceiling) was —60°C ∓2°C (—76°F). The lowest temperature of the barographs as determined the next day in the course of altitude determination tests was —22°C (—8°F). The temperature within the pilot's open cockpit, of course, was much lower than this, probably about —45°C (—49°F). As a result of carefully repeated flight-history tests on the official barograph, which were made during the two following days, the lowest pressure was determined to be 142.9 millimeters of mercury. On rounding out to the next higher whole millimeter of mercury as required by the Fédération Aéronautique Internationale, the value becomes 143 millimeters of mercury, which is equivalent to an altitude of 11,930 meters, or 39,140 feet. This was a new world's record, exceeding the former one set by Lieut. C. C. Champion in the same ship on July 25, 1927, by 722 feet. The flight as a whole, and the instrumental records obtained were the finest that I have ever had the pleasure to observe.

On May 15th Lieut. Paris made a flight from St. Raphaël, France in a C. A. M. S. seaplane carrying a 2,000-kilogram (4,400 pounds) payload. The ship was powered with a Hispana-Suiza engine of 600 horsepower. The lowest pressure attained in this flight was 409 millimeters of mercury, equivalent to 4,827 meters, or to 15,837 feet. At the time, this was a world's record for a seaplane with 2,000 kilograms payload. This record, however, was recently exceeded in this country by Capt. Boris Sergievsky in a Sikorsky S-38 amphibion (with wheels removed) powered with two Pratt and Whitney Hornet engines of 575 horsepower each.

On May 26th, Willi Neuenhofen broke the world's airplane altitude record in a flight made from Dessau, Germany, in a Junkers W.34 landplane equipped with a Bristol-Jupiter VII motor of 420 horsepower and with a Bristol supercharger. The plane empty weighed 1094 kilos (2,400 pounds). When loaded with 100 gallons of gas, twenty gallons of oil, the necessary altitude equipment, and the pilot, its total weight was increased to 1,282 kilograms (2,820 pounds). Four barographs were carried on the trip. A Bristol wooden propeller was used with the motor turning over normally at 1,850 revolutions per minute. The weather was ideal for the flight because of the cloudless sky. At the time of take-off, the ground level pressure waswas 758 millimeters of mercury, and the air temperature +17°C (62°F). The temperature at the highest altitude was —50°C (—58°F). A Dräger-Werk oxygen ap-

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AIR—HOT AND OTHERWISE

The N.A.A.—That's Enough

By Frank A. Tichenor

IN August, 1926, through this department AERO DIGEST issued " . . . a call to those whose interest in aviation is such that they honestly want to see it prosper in its commercial activities and rank at the head of our national defense system where it rightfully belongs.

" . . . an urge to the members of the N. A. A. to send delegates to the (then approaching) convention who will formulate a program that will help transfer the record of the organization from comic pages to the news columns of the daily press."

We suggested that the local chapters send to that convention delegates who could think thoughts worthy of America and Aeronautics; we begged the pilots among them who had served in the World War to borrow back their old machine guns and spring to the logical task; we urged that action be taken by the American Legion, the members of the independent aero clubs and all others whose jobs or special interests suggested that they might be useful.

We sought effective words with which to implore all to get busy and help transform the N. A. A. into that which it might and should be, but was not—a power in American aeronautics, capable of rightly impressing Congress and performing those important tasks needed by the industry, the services and the nation.

Since then there has been no activity in the N. A. A. except the continued stupid procedure of the Natural Tommyrotters in its membership meeting as a Committee of the Whole. They have been responsible for various disastrous deeds, including old Hire'em Bingham, apostle of an air force for which every nut and bolt must be carved from a wooden nutmeg by a highly protected Connecticut manufacturer. They have crabbed the game, hijacked it for unfair advantages, put every honest and progressive plan upon the spot and shot it down. Gang murder of constructivism.

Since another convention is approaching, why isn't now, four years later, the time to start all over?

In August, 1926, we said, "The National Geographic Society has 112,000 members in New York State alone. Surely the national defense and economic welfare of the United States are as important as its geographical education." We added, "The National Aeronautic Association should have at least one million members and twice as many Juniors."

If in the years of its existence its leaders had devoted the same amount of time and energy to securing Junior members that they have devoted to playing petty politics, if they had taken into the Junior organization all the right sort of boys and girls that they could get, these youngsters, having entered, say, at sixteen, would now be Senior members and able to run the association properly.

Furthermore, they would be voters, upon election days able to choose, for National and State officers, such men as would put through any legislation necessary for the aeronautic industry's rapid expansion.

"We need," we said away back there in 1926, "a re-born National Aeronautic Association. Fresh blood, active brains and the elimination of all flunkyism and favoritism."

Conditions have not changed materially in the past four years. The N.A.A. has fewer than 8,000 paid members—maybe many less. Of approximately 200 chapters only ninety-two really have enough paid members to retain their charters. The San Bernardino Valley Chapter (California), organized three years ago, has not one paid-up member at the present time. Other chapters are going the same way.

Obviously something worse than the Japanese fruit fly, which has ruined Florida's orange groves, is gnawing at the N. A. A. Presently the parasite will have to pass along, seeking other forage, for there will be no N. A. A. left.

Some local chapters still exist in whose veins real life blood courses, but you could stab the national organization deeply, front or back, and never strike a corpuscle. The Southern California Chapter, the Aero Club of Pennsylvania Chapter, the Milwaukee Chapter—all these and others are making satisfactory r.p.m.'s. The whirr of their progressiveness is welcome in the midst of silently dead engines elsewhere in the organization—engines dead because the parent body has no fuel of enthusiasm, enterprise, whole-hearted zip and bang and whack, no honest-to-goodness patriotism to pump into their tanks.

The makings of an active chapter exist in every city of the Union, and the recent census figures show how much that might mean, for out of every score of healthy, intelligent and red-blooded Americans at least five should be available for membership in the right kind of chapter, fed and nurtured by the right kind of parent body.

A going, growing, busy, organized group should exist in every city; even in a majority of the villages of the United States there is material which would rally 'round the cause of national aviation if the right kind of central organization were on the job working hard for members full of pep.

The National Exchange Club, with its 50,000 enthusiastic whoopers-up shouting for American aviation, as a side line has accomplished 1,851 aeronautical objectives in two years—several hundred times as many as the National Aeronautic Association ever has attempted. Scores of aero clubs are organized and going strong which won't affiliate with the N. A. A. because of natural disinclination to associate with a weak body.

In that old issue of AERO DIGEST we remarked:

"The National Aeronautic Association should have at least one million members and twice as many Juniors." We added, "With the proper leader and a worth-while program, no occasion would exist for the independent clubs which now for perfectly good reasons ignore the N. A. A. When this leader and this program are secured, these independent clubs soon will be seeking entrance to the fold."

If, today, we reach out for the new phalanxes of boys and girls, all eager to be eager for whatever may be good for the nation which they love more earnestly than some of their elders seem to, we might have a body of real voters in a few years which would mean permanence for the nation's safety, progress for the nation's business and speed for national thought.

Of what other body, supposed to be made up of American enthusiasts, can it be said, now, that everything that was charged in 1926 of incompetence, inconsequentiality and ingrained idiocy remains unchanged in 1930?

But do not despair, Americans; if the N. A. A. remains static, it will at least be dis-

(*Continued on page 222*)

TRAINING ARMY AIR CORPS TECHNICIANS

at Chanute Field, Rantoul, Ill.

Lester L. Ogle

THE Army's Technical School of the Air is located at Chanute Field, Rantoul, Illinois. The airplane mechanics of the Army are trained at this school. Its training courses consist of instruction in officer's maintenance engineering, airplane mechanics, general machinists, aircraft welding, parachute rigging, photography, communications and armament.

The school is located on a 640-acre tract of land adjoinin the city of Rantoul, with a complete unit of buildings to house the various activities. Suitable officers' and enlisted men's quarters, hospital, supply, mess hall, barracks, etc., are also included in the group. All the hangars and workshops are equipped with modern equipment to accomplish any job required on airplanes.

The Air Corps Technical School is the outgrowth of the Air Service Mechanics' School organized at Kelly Field, Texas, during the World War. It was moved to its present location about ten years ago.

The instructor personnel consists of thirty-four civilians, each a specialist in his particular line, and approximately thirty enlisted men, some of whom are assistants and others in charge of departments. Approximately 700 men per year are graduated from the various courses.

The men who are chosen to be trained at this school are selected men whose education and previous experience fit them to become mechanics in the trade in which they are trained. About fifty per cent of these men come directly from civil life; the remainder are picked from Air Corps organizations.

The system of training conducted at the Air Corps Technical School is termed the applicatory method, which

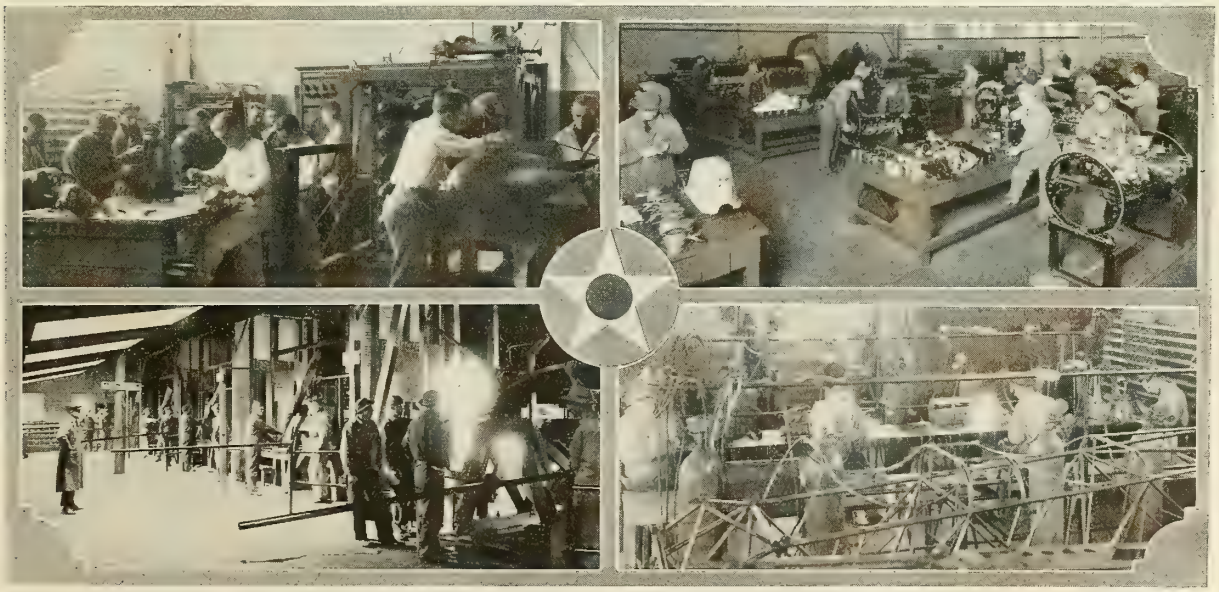


Students at Chanute Field learning to pack parachutes

plan has proved to be the most successful in training mechanics for Air Corps requirements. In this system, the student is given an intensive course of instruction on a series of important operations which make up the mechanics' requirements. This work includes actual shop problems, which are chiefly non-productive exercises, except where practical work is available and will serve the purpose equally well. All the work is done under the supervision of a skilled instructor. A lesson sheet or guide giving detailed instruction in the proper procedure of carrying out an operation is used in connection with the shop work. These sheets or pamphlets are for the purpose of standardizing shop work and assisting the student to analyze properly the particular job to be accomplished.

In addition to the practical work, a series of lectures and discussions dealing with the general principles involved is given to each class as it accomplishes the work outlined. The purpose of this information is to acquaint the student with the necessary theory of that particular phase of aeronautics. Examinations covering all important subject matter are given all students. The questions are made up to cover the significant points in the lectures and shop work, and they direct the students' attention to the reasons work is undertaken in some particular manner.

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Various phases of the technical training of Air Corps personnel: Upper left, studying bomb repair and aerial armament; right, gaining practical experience in engine repair; lower left, engine block testing; right, learning welding methods

HITCH-HIKING ON THE CLOUDS

Wolf Hirth

Holder, Sailplane Distance Record, Returning to Point of Departure

LONG-DISTANCE soaring flight has become more and more the goal of master glider pilots. The distance performances of the first Rhoen flights in 1920 and 1921 were actually only glides, except Dr. Klemperer's flight to the town of Gersfeld, which may correctly be termed the first typical soaring flight in Germany. Shortly after, the first attempts were made to regain height at several slopes lying in the route of a distance flight. Nehring, who was only a little two-by-four and therefore well fit for soaring, was successful in extending his trips more and more, picking up altitude here and there. The most surprising flight, however, in this early stage was the thunderstorm ride of Max Kegel in 1926. Caught in the front upwinds of a suddenly rising thunderstorm, Kegel was carried up to an altitude of 5,000 feet and covered in his glide a distance of fifty-two miles.



Krönfeld being launched in his sailplane, "Vienna," on a record flight during which he reached 6,500 feet and traveled 93 miles

Another phase of motorless flight is the sand dune soaring along a seashore. The wind blows over the water surface free and undisturbed and even a low sand dune in its way causes an excellent, steady current. The seashore always has been the best location for making duration flights. But the pilot must have a great deal of patience and endurance to cruise a hundred times back and forth. A passenger once was given a ride for seven hours in the soarer of Ferdinand Schulz along the shore of the Baltic Sea, where Schulz also made his record flight of fourteen hours. Where there are long dunes such as those along the English Channel, or where there is a mountain range range along the shore as in California, pleasant long-distance flights are possible with a minimum of effort.

It was in the year of 1928 that the possibility of cloud-soaring was realized and for the first time was successfully attempted. Warm vertical rising air currents are recognizable by the presence of cumulus clouds, formed at their top. These air currents, which often reach an unbelievable velocity, are strong enough to give lift to the soaring pilot who happens to come into their vicinity and who is just out of gas (or rather, out of wind).

Master soaring flight includes all the above methods of soaring, and a good pilot will never miss a chance to gain some lift whenever he can on his route. But let me review some of my own experiences on soaring trips.

On one occasion, after being launched by the ground crew, I gained my first height by soaring fore and aft along the slope. But soon a white cloud formed not too far away. I waved *Auf Wiedersehen* to my comrades below and heard them yell "Break neck and leg." This pious wish means "good luck" in the glider pilot's language, and so encouraged, I started on my trip cross-country. The silver lining of the cloud so often sung about but seldom reached, came close; I had figured right. It took me along and up. I was on a hitch-hike beneath the cloud. But alas, the life of the cloud was short. The white feathers above me disappeared more and more; I was left alone. My altimeter showed 2,000 feet, which I figured might be enough to reach a well-known mountain range. But was the wind direction right; would I find upwind there? A look at the compass, at my map and then a smoking chimney below assured me of the favor of the gods. It showed that the wind was blowing from the desired direction. A five-mile glide, in which I even took the time to circle above an old interesting castle, brought me over to the new slope where I continued soaring for some time. On that soaring trip I traveled thirty miles by taking advantage of every assisting air current on my way.

I remember well another trip. I was sailing above endless woods, slowly but steadily losing altitude. No smoke, no shadow of a cloud, no soaring hawk, no drifting of my ship showed me the most important thing a soaring pilot has to know—the wind direction, I had to make a big guess. After reaching the lift-promising mountain side I knew on the first curve that my guess had been wrong. No lift at all was apparent. I left there as fast as possible, and I was just able to make a small hill facing another and this time the right direction. It took me almost an hour to regain altitude by steady cruising.

The quality of quick judgment may be the most essential to the art of soaring flight—to realize in the right moment that you must gain height or that it is foolish and useless to stay a minute longer over any particular place where the wind has died. Big miscalculations can be made by studying only the one slope you are over. Very often the surrounding topography has a most important influence on the action of the air currents. A low hill lying in the windward side of a beautiful slope can spoil the winds completely, causing a nasty squall instead of an upwind. The wind may be a faithless fellow and faint for a while; then it takes nerve and a lot of patience to stick to your slope in gentle gliding and to wait for renewed help. To avoid a low current location is just as important as to find an upwind space. It is often advisable to fly a wide detour around an uncertain spot that may spoil the whole flight. Of course, it is possible to fly after a mixed course that can be planned before going up by studying topographical maps. Such a calculation, however, depends on a steady wind direction which unfortunately cannot be assured. Today we can say that motorless flight has changed from hit-or-miss soaring to distance flights to a predetermined goal.

The latest form of soaring flight—and perhaps the most daring—is traveling with a thunderstorm. Robert Krönfeld has shown that an experienced pilot of today need not hesitate to trust his light ship to the powerful lift of a storm. He established in one storm ride the world's distance record of ninety-three miles and altitude record of 6,900 feet for motorless flight. Krönfeld's description of his experience is interesting. (*Continued on page* 212)

The PRINCIPLES of AERODYNAMICS

ARTICLE 1. THE CREATION OF AIR FORCES

Dr. Max M. Munk

THE words *air*ship, *air*plane, and *air*craft mean more than that the vehicles in question are surrounded by air while they are in motion. So also is the bullet from a gun, but nobody for that reason calls it an *air* bullet. Even young boys know that an airship or an airplane not only flies through the air, but that it also uses the air to keep from falling to the earth. An aircraft flying through the air is also supported by the air, propelled by means of the air, and (unfortunately) retarded in its progress by the air.

Older boys, particularly the bright ones, distinguish between the air forces of motionless air and the air forces of moving air. The former air force, the lifting capacity of air that has no motion, has been known much longer than the other kind. It has been used for ballooning for hundreds of years, yet this buoyant power is more startling, impressive and thrilling than the lifting power derived from moving air. I have been an aeronautical engineer during all of my adult life, and have worked on the design of several dirigible airships, some of them the largest built; yet in spite of that and against the reasoning of my mind, my heart beats faster every time I see a huge dirigible, with its tons of structure, machinery and living load, hang motionless in the air. Hundreds of strong men must haul it down to keep it from moving up and away. The same effect is well known in a small scale with toy balloons, but then it is not thrilling to us grown-ups. But maybe the impression has just become worn off; to the little fellows, however, the toy balloon preserves its attractive power from generation to generation. The upward lift remains mysterious and unexpected, for there is no child who does not sometime forget to hold his balloon tight, and—up it goes!

Archimedes, while taking a bath, not only *felt* the lifting effect of the water on his own body, as every hippopotamus does, but unlike the hippopotamus he became *conscious of the lifting effect*. This discovery, now so simple and commonplace, made Archimedes immortal. It seems that Archimedes realized the importance of his discovery, for immensely excited about his discovery, he jumped out of his tub and ran undressed through the streets, shouting "Eureka!" which apparently meant: "I have found it!"

Nevertheless, the supporting power of moving air is indeed a serious problem for us. Dirigibles are lifted principally by the buoyancy (or lift) of the air, but less than a tenth of one per cent of the weight of airplanes is taken care of in that manner. We airplane engineers can forget about the "buoyancy" of airplanes. We must obtain a really clear and distinct understanding of how moving air can do what motionless air cannot. If we cannot understand the thing in a general, broad way, how will we ever understand it in specific cases and in detail? The dynamic force (which literally means "forcing force" and therefore not more than force alone) should be as clear and simple in our minds as the buoyancy or "floating" force. The floating is simple: air has weight, but does not fall because it is supported by the air beneath it. Take the air away and put something in its place which is of equal volume and it is then supported exactly like the air it replaced, as a table is supported by its legs.

The flight of a bird is not startling, chiefly because we have become accustomed to it, but also because it resembles the motion of a stone or ball which has been thrown and is kept aloft for awhile without any applied air forces. That is entirely a natural phenomenon, and yet it has to be understood with great clarity by the man who wants to know about the basic fundamentals of flight. The general absence of a sufficiently clear understanding of the "why and wherefore" in the case of the air carrying an airplane, is manifested by the many mysterious words referring to that action. "Vacuum" and "vortices" are outstanding words of that family. Such terms bear out the contention that language, originally invented for the communication of thought, was later misused for hiding thought; that also has been overcome for many years now, and language is now often used for hiding lack of thought.

Without the use of any words, it is possible to understand in a simple way exactly how moving air is able to carry weight, but of course it cannot be communicated in this article without words. Language has to be employed for that end, and we will try to do so with simple words.

Air carries weight not because it is moving, but because it is moved. Moved by whom, and how and why? When you water your garden with a hose, water is impelled in the direction of the nozzle; all the while you must exert a force on the hose in the direction of the stream of water because the nozzle exerts a force back toward you. An airplane would never be pressed upward by the air unless it first pressed the air *down*. In airplane flight, air must be deflected downward *continuously*. Fresh, resting, peaceful air is continually waked up from its slumber and set in motion down toward the ground. The air thus disturbed resists that motion, thereby pressing the airplane upward. The propeller, likewise, incessantly throws back air that was motionless before, and it pulls the airplane because it is itself pulled by the air in reaction. The propeller is the agency which starts the motion of the air. Because of its particular shape and its rotation, the propeller continuously picks up quiet air, throwing it into a slipstream like the air jet of an office fan. The sluggish air, in its reaction to oppose the impressed change from rest to travel, leaves a measurable and weighable effect, which is called the pulling force or thrust.

To describe particular air motions in detail is a long story. It is quite difficult and, in certain cases, not possible to specify the steps necessary to be taken to obtain a desired air motion. Such, however, is the work of the aircraft engineer, and we must return to that problem later. What we discuss now is something different. We are satisfied that a propeller or airplane forces the air into some specific motion and guides it that way, regardless of why and how the air assumes the motion. Once that motion is known, or assumed, it is not at all difficult to see, feel and understand with what lifting or pulling force the air reacts to the change of its motion.

Let us consider the air, cubic foot by cubic foot, or pound by pound if you prefer. Find out what velocity component each pound of air had before it came into action, and determine the same component after the action. The air force of that pound, its component in the direction considered, is directly proportional to the product of its weight and its velocity change, and inverse to the time or period during which the change took place. This relation is so very fundamental and simple, "force mass acceleration," that nothing expresses (*Continued on page* 204)

The VALUE of NATIONAL AIR RACES

Clifford W. Henderson

General Manager, 1930 National Air Races

"WHY the National Air Races?" is a question sometimes asked, not only by laymen, but by members of the aircraft industry as well. Such skeptics see in the annual air pageant only a circus ballyhoo event, a publicity parade for a few prominent pilots and members of the aeronautical industry, and spectacular exploitation of the air arms of the various services—Army, Navy and Marine Corps. The doubters see in the audiences attending chiefly a mob of ghoulish-minded yokels out for thrills from the hair-raising nature of events by which they will be impressed with the *Dangers* of flying rather than its genuine offerings of Safety, Convenience and Speed.

Had such pessimists dominated the automobile industry cars today would be expensive, slow and more dangerous to operate. It was on automobile speedways that the high-compression engine was evolved, that such important refinements as four-wheel brakes proved their place as standard equipment. Much of the speed, safety and convenience in the present development of the automobile may be traced to the motor speedways.

The National Air Races are performing the same function for aeronautics. When the tapered-wing job made its bow in the transcontinental derby of 1928, other contestants protested against the radical design. Two years later we find the clipped wing jobs universally popular in the medium-priced airplane field, for the increased speed offered.

The airplane owner with the lowly OX job which is entered in an event must pay strict attention to his streamlining. In working out his own problems, he is using his brains for the good of the whole industry.

In the 1929 air races one so-called "Mystery Ship" was the sensation of the show. It provided competing manufacturers with a new standard of speed to eclipse—194 miles an hour for a commercial job. Boots to reduce the wind resistance on landing gears, cowlings to accomplish the same purpose with engines, both were evolved principally through lessons demonstrated at the air races.

The 1930 races may be depended on to bring forth several "mystery" ships, which will make their bow at Chicago. The public will see them and other manufacturers will adapt from them those advances in design which most impress them.

In the field of power similar developments will be in evidence. The adaptation to commercial jobs of the supercharger, which in the past has been confined to service planes, is assured. The Diesel aircraft engine will be demonstrated in its present advanced refinement, and fliers who are familiar only with the high-compression gasoline engine may inspect and compare its performance in the air.

The Women's Air Derby of 1929 is chiefly responsible for publicizing the fact that women as well as men may fly. That race event is deemed the greatest single stimulus to the enrollment in flying schools of several hundred women student-pilots in the ensuing six months and the advance of scores of girl fliers from private pilots to the highest license class—transport pilots.

The National Air Races truthfully may be described as the *laboratory* of the aeronautical industry. In them and from them, engineering and aerodynamic problems, safety, comfort, speed, all are advanced. Everyone interested in aeronautics, from the greenest pilot to the manufacturer, must profit by attendance.

Let us analyze the race audiences. In the first place, every race is marked by months of activity before the event opens. The race unfailingly arouses wide civic interest in the city where it is held. All the civic and fraternal bodies are educated and enthused in the whole broad subject of aviation. These groups are made air-active, as well as air-minded.

Although it is true that many laymen are primarily attracted to the grandstands in search of thrills, all unconsciously absorb some basic knowledge of flying. They see the airmen and airwomen (*Continued on page* 194)



Artist's conception of Curtiss-Wright-Reynolds Airport as it will appear during the 1930 National Air Races

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UNIONIZING OF AIRMEN

THE widely advanced proposition that air pilots and mechanics should affiliate with the Brotherhood of Locomotive Engineers is not meeting with universal favor. As a matter of fact, the proposition was that the affiliation should be jointly of "pilots and truck drivers."

Airmen apparently are hard-headed and soft-hearted; they respect all honest men, but perhaps some of them may shrink a little at the thought of being classed in a labor union with truck drivers—men whose calling is usually somewhat less aspiring (and inspiring as well) than that of the air pilot and surely requires somewhat less of technical skill.

And it may be well for the pilots and mechanics who are being approached in connection with this enterprise to remember that probably the principal reason they are being so approached is that the ranks of the Brotherhood of Locomotive Engineers, which formerly was the haughtiest and most exclusive labor union in America, one which only upon sufferance would admit even the President of the United States to honorary membership, now finds its ranks a little thinned as the result of electric traction, bus line extension and other similar transportation developments.

Our advice to the pilots and mechanics is to stick to their own kind, with their own psychology, their own ideals, their own language and traditions. Not that they are better than others, but that they are distinctly different and highly characteristic. One would hesitate to say that a higher *esprit de corps* exists among airmen than among locomotive engineers, but it is certain that that of the airmen is entirely different.

The pilots and mechanics of the air industry will operate most effectively under the guidance of men who know flying and the things which make it great. We believe, and we hope that everyone of the men involved also believes, that the qualified aircraft pilot must be of a mental calibre as much in advance of that developed by the comparatively gentle art of railroading or truck driving, as the speed of his aircraft is greater than that of a hurrying train or of a lumbering truck.

THE POSTAGE RATE

BY THE time this issue of AERO DIGEST goes to press the stipulations of the Watres Bill will have been analyzed by the Postmaster General and contracts will have been signed, we hope to the satisfaction of everyone concerned. Thus comes the realization of a goal for which many of us have striven. Here in the office of AERO DIGEST we never have doubted that this event was on the way.

Another thing of which no one in the air industry ought to lose sight is that this eventuation is another step toward that very great desideratum—where distance makes such procedure efficient, the carrying of all first class mail by air and at the two-cent rate.

We believe we were the first to advocate this advance in the American postal service. At any rate, as long ago as 1925 we began discussing it, arguing for it, pointing out its manifold and manifest advantages. We shall keep on urging it until it is an accomplished fact.

When all first class mail matter now carried by trains is air-borne, America will take a sudden and astonishing step forward commercially.

The quickness of air delivery for specially stamped mail has already had a tremendously beneficial effect on commercial and financial life. ALL FIRST CLASS MAIL BY AIR IN 1933 OR SOONER should be a logical objective for the industry and everyone associated with it.

ELMER SPERRY

ELMER SPERRY'S recent death leaves a vacancy not only in the hearts of a multitude of admiring friends, but actually in the world of thought and science. Few contributions to the safety and comfort of ocean travel have been as great as his gyroscopic ship-stabilizer. Its adaptation in the gyroscopic compass, and his contributions in the lighting of airports and airways mark other great advances in navigation aids. For the safety and comfort of air travelers it probably will prove, ere long, that he did even more than he did for ocean voyagers.

When a practical genius like Elmer Sperry passes, the world's loss is real indeed!

LIGHTER-THAN-AIR

PERHAPS the most striking thing Dr. Eckener has said regarding the *Graf Zeppelin* was, that during a brief period of bumpy blowing over the North Atlantic during her recent journey from Friedrichshafen to New York, by way of South America, "the *Graf* bucked and rolled like an ocean liner."

The inference is plain and pleasant; air travel is normally far smoother, as it certainly is infinitely faster, and presently may be expected to be more comfortable than travel in a surface ship.

In 1928 the *Graf* was caught in a Newfoundland storm and her experience "showed," said Eckener, "that our airships must be stronger"; in the 'round-the-world trip of the following year fierce storms assailed the airship over Siberia; on her double cross-Atlantic and North and South American wanderings recently she "bucked and rolled like an ocean liner."

Another great airship which America soon will see will be the British dirigible, a veritable monster, calculated to dwarf the *Graf* in size, greatly surpass her in strength, excel her tremendously in power. If the *Graf* has not already proved it, this great English ship may prove that Lindbergh was quite right when he declared, "the airship has definitely established its present-day superiority over heavier-than-air craft for transatlantic travel."

In all her over-ocean traveling the *Graf* stayed far closer to her schedule than ocean liners used to do. And six crossings have proved conclusive enough to be regarded as a satisfactory test. It is not unreasonable to take Dr. Eckener seriously when he says that a regularly scheduled transatlantic passenger and mail service is now actually in sight, nor is it, in the circumstances, difficult to believe that Britain's R-100 and R-101, in which some payload has been sacrificed for additional strength, may supply (as

one of Dr. Eckener's aids, who looked them over, says they will) "the world's safest transportation."

Lighter-than-air is coming, not only for air transport, but for national defense. The accomplishment of the *Graf Zeppelin* justifies all that Admiral Moffett ever has said upon the subject, once again endorsing the wisdom of Secretary Adams in backing him for reappointment by the President.

OPTIMISM FOR THE MANUFACTURER

PASSENGERS are learning that it is not only profitable but pleasant to fly. The Universal Air Lines Division of American Airways showed an increase of fourteen per cent to 2,321 passengers flown in April. For the same month these lines increased their monthly air mail total by 3,072 pounds. In the same month the New York, Rio and Buenos Aires Line carried 1,108 passengers, an increase of eleven per cent.

T.A.T.-Maddux during May carried 5,474 passengers and flew 244,286 miles, having carried 19,307 passengers and flown 971,242 miles during the first five months of the year. Virtually a quarter of a million miles for one company in a single month. Four years ago only one airline in the United States (Western Air Express) was carrying passengers on a regular daily schedule.

According to Department of Commerce estimates, 150,000 passengers were carried in this country last year, for the first time surpassing the numerical passenger-carrying record of any other country in the world.

Under the new air mail act, passengers may be carried in mail planes. This progressive change, the New York *Times* believes, will double the number of passengers carried in a twelvemonth.

Meantime, Latin-America finds itself with 44,000 miles of developed airways and Latin-America conceivably may buy almost exclusively from the United States. If she does not it will be no one's fault but ours.

Government investigation shows that while there is great reason for continued efforts to make flying safer than it is, the increase in the number of deaths from plane accidents is less than the percentage rise in deaths from automobile accidents in the early days of motor car development.

These facts read Optimism for the American aircraft manufacturer.

NEWSPAPERS NOW FLY

THE New York *Times* is cutting from six to sixteen hours from its delivery time to eastern Canada, northern New York and points in New Hampshire and Vermont by using the airplane as a means of transport in combination with fast trains and motor-trucks. The *Times* is now available in Montreal for breakfast-table instead of for late dinner-table distribution. Such service does more to make the world smaller than anything except the telephone ever has done in the past and probably more than anything except television ever will do in the future.

Airplanes are as valuable in the gathering as in the distribution of news. More than ten years ago the London *Daily Sketch* began to keep an airplane always ready in its hangar to rush photographers and writers to any part of Europe at which big events might chance to "break" unexpectedly. On Memorial Day, this year, readers of the Detroit *News,* thanks to private plane delivery of photographic films, had pictures of the automobile races in Indianapolis during the very afternoon upon which they took place. The newspaper was induced to make the purchase of this plane (which now it could not do without) by one of aviation's best known reporters, Jim Piersol, who, as a matter of fact, did not take up reporting until after he had learned to fly. He is one of a small number of journalistic Mercuries, today; before long we shall have a veritable flock of winged news-gatherers.

And all this means not only a brand new market for the industry but a chance for some enterprising group to furnish regular newspaper delivery service from the larger cities at times especially convenient for newspapers, spreading the freshly printed sheets from all the great American centers of well populated regions. Carrying of newspapers can be made a good source of income by many wide-awake flying companies in this country whose intelligent inhabitants are always willing to pay to get the latest word at the earliest possible moment.

HOOVER WISDOM

ON CERTAIN topics and at certain times President Hoover is as inarticulate as Calvin Coolidge.

To one interlude of wordlessness AERO DIGEST wishes to direct attention—and foreign newspapers please copy.

Hoover is a better sailor than his predecessor and was vigorously alert-minded during the whole of the recent occasion when he watched four-fifths of this nation's fighting sea-power off the Virginia Capes approach grimly over the horizon. While the dreadnoughts were ploughing ponderously between him and the horizon, Admiral Charles Frederick Hughes, Chief of Naval Operations, gazing at them with an affection perhaps accentuated by the fact that he is soon to be retired, approached and said, enthusiastically:

"I tell you those ships are the backbone of the fleet!"

President Herbert Hoover let the remark pass without comment.

GLENN CURTISS AND TWENTY YEARS

WHEN Glenn Curtiss recently celebrated the twentieth anniversary of his first epochal flight down the Hudson from Albany to New York, even he must have enthused over the vast difference between the quaint machine he used on his first flight and that which bore him on his most recent. The famous aviator, inventor and manufacturer scarcely could credit his own vivid memories of that other day when, in a frail plane built very much like a box-kite, he made the nation gasp by the boldness of his great adventure. What was a mere hop the other day, was an epochal journey then.

The greatest stupidity, the greatest inefficiency, the greatest misuse of God-given privilege and opportunity would be for the United States to fail to retain leadership in every branch of the great art which was born in the Wright's brains and which has been nurtured, promoted, developed and advanced by such men as Glenn Hammond Curtiss.

Our young pilots and the youthful flying men of other nations today are doing splendid things, bold things, ingenious and constructive things in the air. But the world's debt to the now greying men who were the pioneers, a small group, of whom Curtiss is among the most important, can not be computed.

Congress certainly ought to award to Curtiss the Medal of Honor provided for in the bill recently introduced by Congresswoman Ruth Bryan Owen

AN EXTRA SPECTATOR AT THE FIRST FLIGHT



John R. McMahon

HOW many persons saw the world's first successful airplane fly on December 17, 1903? Five besides the inventors, Wilbur and Orville Wright, is the hitherto accepted answer based on the most direct and authentic testimony. The Wright brothers themselves, in a jointly written magazine article published two decades ago, stated that there were five witnesses—John T. Daniels, W. S. Dough and A. D. Etheridge, of the Kitty Hawk life saving station, who came by request to help launch the virgin aircraft; and two spectators, W. C. Brinkley, a lumber buyer, and "Mr. John Ward"—the latter a typographical slip for Johnny Moore, a sixteen-year-old boy.

It now appears that the meticulous Wrights and all the earnest compilers of press "morgue" history were not strictly accurate in their count. Not five but *six* persons besides the inventors saw the first airplane fly on December 17, 1903. The sixth was Robert L. Wescott, a member of the Kitty Hawk life saving crew with the rank of No. 1 Surfman.

But let me pause to thank Mr. Thomas B. Booth, a prominent member of the American bar and one-time special assistant to the Attorney General of the United States, for setting me aright—conjuring the mysterious sixth spectator out of the darksome caverns of a voluminous legal record. Mr. Booth, who dwells in Boston but has offices in New York and Washington, as well as in his home city, broke the news to me recently, even supplying photostats of the aforesaid Wescott's sworn testimony.

History is said to be a prevarication agreed on. That seems fair enough, but the agreement should be respected and the statistics especially should be considered inviolate.

The Wrights were truthful and careful observers. If they had seen Wescott present on that memorable day, they would have recorded it. Aside from the point of their habitual veracity, it was to their interest to have as many witnesses as possible. Ergo, Wescott was not there or at least was not visible. It follows that he must have been hidden. How and where could he hide? There was no cover for a concealed spectator on the bare sands of Kill Devil hill or in the immediate vicinity. The inventors' camp hut might have sheltered the sixth witness, but as a matter of fact it did not. Nor were there other buildings in the sandy wilderness nearby. A hypothetical duck blind in Albemarle Sound does not explain it.

Wescott was there and not there. He saw without being on the scene. He was a bootleg spectator at the birth of aviation and a keyhole observer at one of history's prime moments. These terms are applied in all respect and even in envy. Who would not like to have done what Wescott did and to have seen what he saw?

Wescott just stayed at the life saving station three quarters of a mile distant from the Wrights' camp. He was the only man left at the station, his comrades having been summoned to help launch the virgin plane. He was thus in charge of the station, and his duty required that he scan the Atlantic Ocean, white-capped with a twenty-two-mile breeze, and the North Carolina coast, bleak under a leaden sky. Thus dutifully scanning land and sea through the official government telescope or spyglass, an instrument of excellent power, Wescott turned his gaze to Kill Devil hill. He saw and recognized easily every person there. They were at work "on the flat beach" at the base of the hill where a monorail track had been laid. He beheld what was being done with a queer contraption like a giant box kite in which a loud-snorting engine had been put. The spyglass gave him a close-up view of the scene as though he stood within a few rods instead of three-fourths of a mile away.

Wescott saw Orville lie down in the machine upon the lower wing and take the first ride of twelve seconds. He saw that Wilbur had the next short and low trip through the air. Then it was Orville's turn, but there was not much improvement in time or distance covered. But say! the last voyage, which fell to Wilbur's lot, turned out to be a real jaunt. The dingus was in the air for a minute or so, and it traveled somewhere between 800 and 900 feet.

The whole show lasted an hour and a half, concluding at midday. No doubt the conscientious station observer swept the horizon at intervals with his glass, combining duty with pleasure.

What a marvelous sight Westcott, No. 1 Surfman, saw that day! And why didn't he hasten to tell the world of his rare spyglass view? The answer is the world did not

(*Continued on page 202*)



The first Wright airplane shed and experimental shop at Kitty Hawk, North Carolina. in 1903

CAUSES AND PREVENTIONS OF FLAT AND INVERTED SPINS

(PART 2)

By

Garland Powell Peed, Jr.

IN normal flight an airplane is pulled along by the thrust of the propeller, and its flight path is a resultant of this thrust and air force on an inclined plane. As soon as the motor is shut off, the thrust is removed and the resulting flight path is determined by gravity and the gliding efficiency of the plane, which is roughly determinable by the L/D ratio. However, instead of acting forward, as does the motor thrust, gravity acts downward; and in spinning the angle of attack is very high. Therefore, using V_R as the resultant velocity, C_N as the lift coefficient, W as weight and S as the surface,

$$V_R = \sqrt{W/C_N S}$$

neglecting parasite resistance and other factors that for any one ship are constant.

Then as W/S remains constant for each particular ship:

$$V_R \text{ varies as } \sqrt{1/C_N}$$

Figure 6 gives these values for several values of W/S. From this chart we see that the lower the value of C_N, the higher the value of V_R must be to equalize the weight of the plane. Then, since the angle of attack varies so greatly along the span, the outer wing tip must travel much faster to carry its share of the weight. This is given by the ratio

$$\frac{V_R \text{ outer tip}}{V_R \text{ outer tip}} = \frac{\sqrt{V_Y^2 + [2\pi\{r + \tfrac{1}{2}(b\cos\varphi)\cos\mu\}]^2}}{\sqrt{V_Y^2 + [2\pi\{r - \tfrac{1}{2}(b\cos\varphi)\cos\mu\}]^2}}$$

where V_Y = Sinking distance per turn.

r = Radius of spin to C.G.,
b = Span,
φ = Angle of yaw, and
μ = Angle of pitch.

But to be in spinning equilibrium the V_Y of the two tips must be equal. Then as:

$$\frac{V_Y}{2\pi[r + \tfrac{1}{2}(b\cos\varphi)\cos\mu]} = Tan\ \varphi \text{ (outer tip)}$$

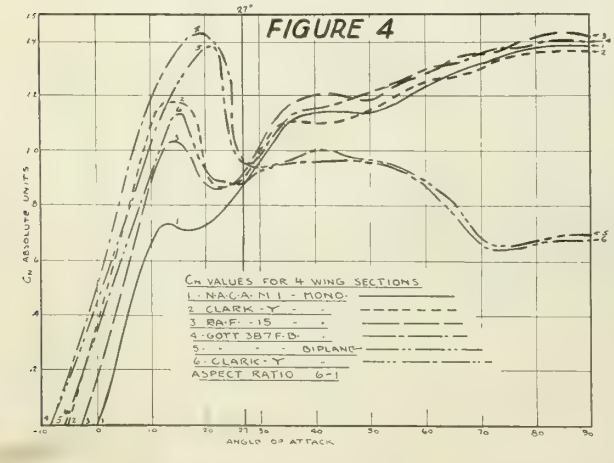
when φ equals angle of the flight path to the horizon of the outer tip. Then $2\pi[r + \tfrac{1}{2}(b\cos\varphi)\cos\mu]$ Tan φ (outer tip) must remain equal to V_Y. Then the V_R ratio becomes

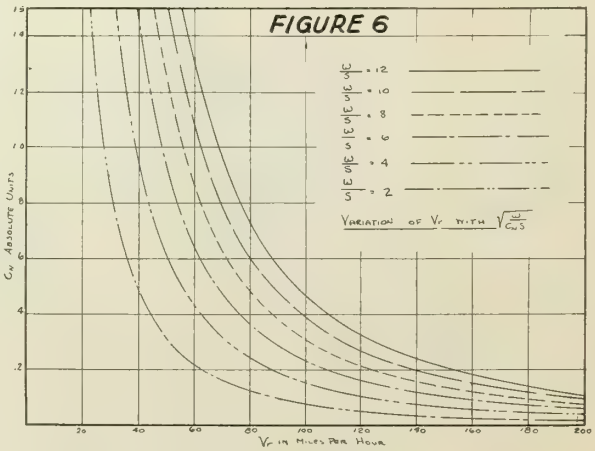
$$\frac{[r + \tfrac{1}{2}(b\cos\varphi)\cos\mu]\sqrt{Tan\,\varphi + 1}}{[r - \tfrac{1}{2}(b\cos\varphi)\cos\mu]\sqrt{Tan\,\varphi' + 1}}$$

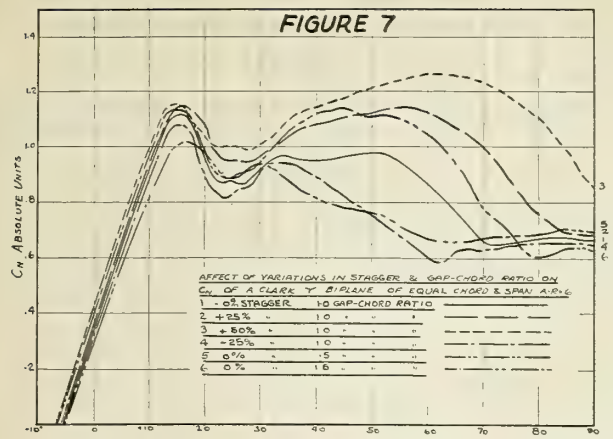
when φ' is angle of flight path to the horizon of the inner tip. Then the greater r becomes, the less will be the proportionate difference between V_R outer and V_R inner. So that the larger we can make the radius of the spin, the less will be the forces that must be overcome to revert this spin to normal flight. However, here another condition enters. To flatten the angle of pitch, it is necessary to build up the moments above the center of gravity on the Y axis and to give a large progression along the Z axis. This tends to flatten the plane's path and to decrease the variation between the angle of attack of the tips, and therefore decreases the V_R ratio. Now if, at this time, the C_N value on the inner wing decreases for any reason, this wing will tend to drop until the increase in speed, resulting from this falling-off, balances the decreased lift; the increased speed, however, has resulted in increased progression of moments to such an extent that the center of pressure of the wing has moved from beneath the center line of the ship to some point on the outer wing. The progressions balance the unbalanced moment due to the pressure off center and the ship is in spinning equilibrium.

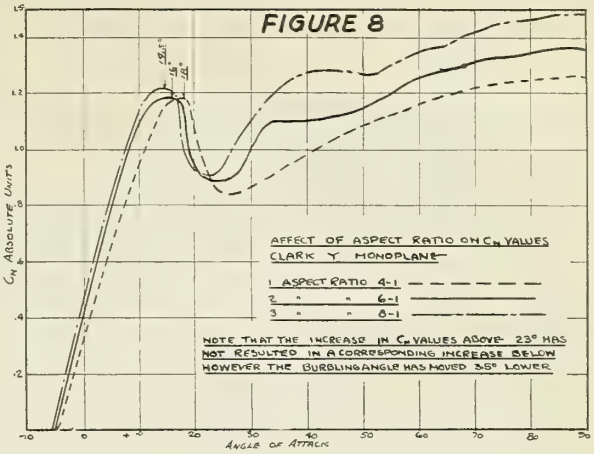
Returning to the "charts," the biplane shows a decrease in lift at the higher angles, so that the conditions noted hold for this type of wing arrangement. Then, in the biplane, it is essential that the progression of moments be favorable and that a forward center of gravity be designed into this type to prevent flat spinning. Seemingly, there is no standard biplane built today that cannot be made to flat spin under adverse loading conditions. However, this does not prevent normal spinning, and it may be that spinning is impossible to prevent in a biplane.

For the monoplane, the charted values show a steady increase in C_N at the higher angles. From this, then, we can expect to get conditions opposite to that of the biplane, especially in the cantilever low-wing type, where the progression of moments are all unfavorable. Here the inner wing is doing most of the lifting, and the moments are augmenting the unbalanced forces set up. Then the airplane tends to rotate away from the spin's axis and the









resultant is a partial turn, first to one side, then to the other, resembling in all particulars a "falling-leaf."

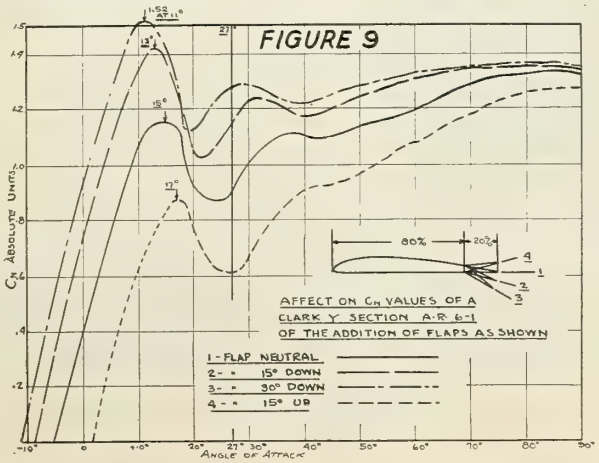
This shows a distinct line of demarcation between the biplane and the monoplane, although each case will have to be investigated individually. The high-wing monoplane would be governed by biplane characteristics, since the progression of moments are similar. It is a general rule, however, that the more efficient the ship, the greater the possibilities of flat spinning.

The problem of flat spinning is primarily one of advanced design. The earlier types of planes were almost totally lacking in the requirements necessary for this maneuver. These conditions will probably be met with more and more in the future, for the further the advance in engineering, the more the necessary requirements are fulfilled.

I am not trying here to minimize the importance of the progression of moments, but merely stating that the existence of an unfavorable progression is not in itself sufficient to cause the spin. The moments are a very large factor in giving the ship its initial flat turn in a great number of cases. There have been instances, nevertheless, in which the flat spin was present from the first turn, and whereas the moment progression undoubtedly helped to cause this, it is not by any means the controlling factor. Because this has been gone into very fully in other studies of the subject, I will not attempt to give a detailed explanation here, other than to state that an unfavorable progression coupled with other unfavorable qualities will, in nearly all cases, result in a flat spin.

Center of gravity location has very little effect upon the spinning characteristics. Certain biplanes will flat spin with forward center of gravity, but are perfectly normal when rigged properly with the center of gravity farther aft. However, the qualities necessary for this maneuver were present before the center of gravity was changed. It is, of course, necessary that that progression be favorable for spinning to obtain the very tight "flat spin"—though it is entirely possible that even with a slightly unfavorabe progression a true spin of this type can be obtained. I have in mind a biplane at present on the market, which normally has extremely easy handling qualities with absolutely no trace of characteristics we have been discussing. However, by poor rigging, cutting down the stagger and adding "wash-in" to the tips—the plane is susceptible to true "flat spins." The center of gravity, if changed at all, is moved forward, tending toward normal spinning. An investigation in the C_N values of this ship, however, showed an unusually low value for the ship with the lessened stagger; on this factor can be laid the blame for the uncontrolled spinning experienced.

The second Alexander Bullet, which had flat spinning tendencies, had a center of gravity of about 24 per cent. The latest Bullet, which does not spin at all, has a center of gravity location of 34 per cent. In fact, the farther aft the center of gravity location the steadier the ship is in flight. In a left spin with an induced tail heaviness, due to gyroscopic action of the propeller (in full load test with farthest rear center of gracity; during this test the center of gravity was to the rear of the center of pressure, due to the propeller moment) the ship showed less tendency to fall off to the left than to the right. Similiarly with a lighter pilot. When stalled and a spin attempted with a center of gravity location of 34 per cent, the ship went through a performance that can only be described as a slow "falling leaf" with the nose very high and no tendency to rotate in any direction. This continued as long as the controls were held in the spinning position and immediately upon their release the ship resumed normal flight at a highly stalled angle. Another characteristic was also noted; if the ship is stalled with the nose very high and full rudder is applied, it tends to turn first towards the rudder as in a normal ship; then the opposite wing drops and the ship dives in an almost di-



(*Continued on page 200*)

AVIATION NEEDS SALESMANSHIP

George M. Wheeler

BLAIR WHITLOCK, aircraft manufacturer, leaped to his feet. Hot indignation filled him.

"But, Dad," he cried, "you don't seem to realize that aviation is in a flat spin. For some time after Lindbergh flew to Paris and put aeronautics on the front page of every newspaper in America, the industry was zooming. But now it has stalled at last and is falling out of control. There's nothing we can do to prevent a nasty crash and perhaps a total washout."

The automobile manufacturer looked at his glum son and smiled.

"We went through the very same thing, Blair," he said, reassuringly. "Only we didn't describe it exactly that way. Let's see . . . the way it looked to most of us, some years ago, was that the whole automobile industry was skidding down grade without brakes, a smash-up at the bottom of the hill seemingly inevitable. But somehow we pulled through. At least, the industry is still on its feet and managing to turn out several million cars each year. How many airplanes did you make in 1929?"

"Oh, about 6,000, I suppose."

"What?" the father interrupted. "Do you mean to tell me that the entire industry sold no more planes than that, altogether? How many of you manufacturers are there, anyway?"

"About 200, I guess."

"Good Gulf! Two hundred manufacturers to make only 6,000 planes! That's only thirty each in the whole year. No wonder your industry is in a tail spin. Why, I make more units every day than the entire aeromotive industry makes in a whole year."

"Yes, Dad, but you must remember that everybody and his wife wants a motor car. It's no job to sell an automobile."

"Maybe so; but it's only because we've made the public appreciate the value and pleasure of motoring. It seems only yesterday that we were trying to increase the automotive industry's production to 10,000 cars a year. In those days, the only thing that was harder to sell than an automobile was the idea of spending good money for mere highways. And, believe me, we didn't have half the advantages that you flying chaps have."

"What advantages, Dad?"

"Well, free publicity, for example. The very word 'Flying' is so pregnant with romance and adventure that it stirs the imagination of millions of people. That's why all the magazines and newspapers devote so much space to aviation. They recognize human interest when they see it; they know that their readers are interested in anything and everything that's aeronautical. I doubt if there's another industry in the history of the world that has ever been able to get a tenth as much free advertising as you are getting. Why don't you cash in on it?"

"What do you mean, cash in on it?"

"Why, just this: Flying needs advertising—aviation needs salesmanship."

"But, Father, that's one of the chief troubles. Our industry has had too much salesmanship. That's why it's grown so fast that nobody could keep up with the demands upon it. The whole industry is over-inflated. Too much selling of scenery and prospects and not enough study of the hard economies. Right now we are sick from too much salesmanship."

"Poppycock! There's no such thing as too much salesmanship. Perhaps you are over-inflated a little. What of it? Most promising young industries are, at first. The stock market slump helped correct that; and you are now simply going through a healthy, perfectly natural, readjustment period. What you've got to do now is to step up your output and obtain the economies of mass production."

"Dad, are you crazy? We're over-produced already—worse than we've ever been before. And everybody is talking about curtailing."

"Curtailing? Why? Don't you know that curtailment is only a temporary stop-gap? Haven't you learned yet that your real trouble is not over-production? It's under-consumption. Rent, taxes, interest on investment, and a score of other items of plant overhead go on just the same whether you're working full time or not. You've got to keep your manufacturing plant going at full capacity. You've got to keep every dollar invested working at least eight hours a day, five days a week, fifty-two weeks a year. The more airplanes you make, the cheaper you will be able to make them."

"But, what's the use of making them if you can't sell them?"

"Not a bit of use. I'll admit that. But you *can* sell them if you'll try hard enough. You've got to worry less about production and think more about distribution. You've got to invest more time and money and effort in salesmanship.

"How many automobiles do you think we'd sell if we didn't have dealers in every town—if we didn't have our advertisements in every newspaper and magazine? Where would we be if we had only a handfull of retail outlets throughout the whole country? We'd be bankrupt in no time. What you airplane makers need is more salesmanship."

"Perhaps you're right, but how can we go about getting it? We've thought that we were using salesmanship all along. What do you suggest?"

"Well, aside from doubling your present sales and advertising appropriations, why not put the pilots to work? According to one of your trade journals I've just been reading, there are now about 11,500 licensed pilots in the country and some 4,000 student pilots. In other words, 15,500 prospective airplane salesmen—every one of whom is a potential purchaser of an airplane. Yet you tell me that today there are less than 7,000 licensed airplanes in the United States. Really, you folks ought to be ashamed of yourselves."

"But, Dad, you must realize that about ninety-one per cent of these pilots and students can't afford to buy a plane. They simply don't have enough money. You've got to take that in consideration."

"Tommyrot! Does lack of money prevent them from getting some friend or acquaintance to back them? Not even the biggest companies in the country would be able to buy the plants and machinery they need, if they didn't get somebody else to put up the money. What's a bond-issue or stock-flotation anyhow, if it isn't selling somebody else the idea of backing you?"

"But, Dad, don't you think it would be hard for any young flier to get you to buy him a plane?"

"Sure. But just the same, he could do it if he'd convince me that I had a good chance of getting my money back, together with a profit."

(*Continued on page* 212)

Only Goodyear can give your planes

AIRWHEEL SAFETY!

Every great success has its horde of imitations, and Goodyear Airwheels have certainly been a success.

Their success is due, first of all, to the careful engineering which went into their development, and to the months of testing, under every type of flying condition, which preceded their introduction.

You cannot get the benefits of such experience in any other "low pressure" tire.

Airwheels operate at pressures as low as 5 pounds. Even on ships weighing 20,000 pounds, a pressure of 13 pounds is enough.

You cannot get such protection as Airwheels give to forced landings on plowed fields, mud or sand, unless you get tires which have equally great air volume. Mere balloon tires cannot approach Airwheels in safety.

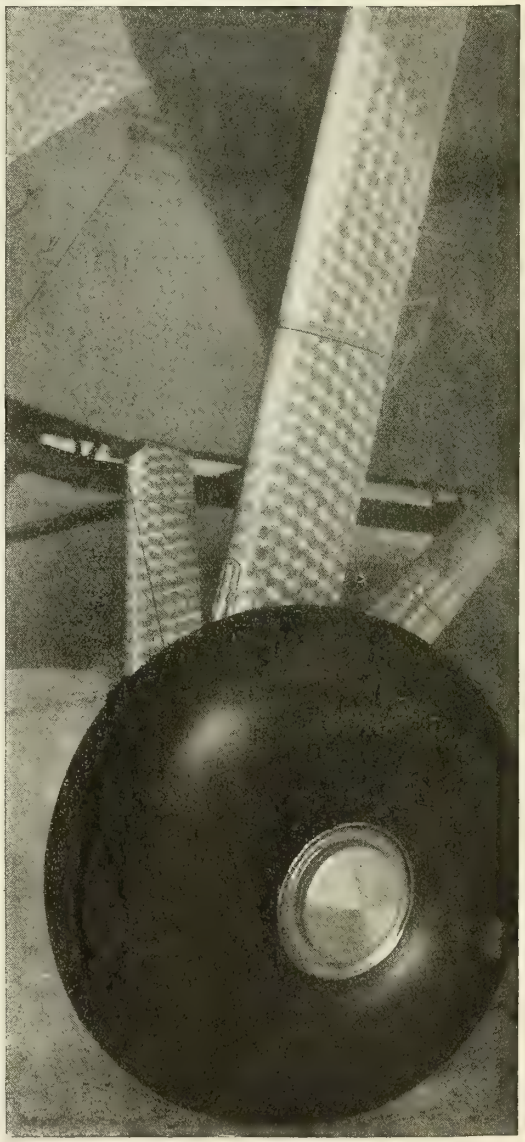
Airwheels are mounted on special hubs, with internal brakes, self-centering. These hubs had to be engineered and developed to make the tremendous air volume of Airwheels possible, and they provide the surest, safest braking operation known to aviation.

You cannot get these special Goodyear hubs and brakes except with Airwheels.

If you are interested in the protection which these great, soft, rolling cushions of rubber can give to your ship—in forced landings, cross-wind and down-wind landings, and take-offs and ground loops—remember that only Goodyear can give your planes Airwheel safety.

Before you undertake the cost of redesigning ships for different tire equipment, be sure the new equipment you select is right. Goodyear invites competitive demonstration. On a Goodyear ship, Airwheels will show you what they can do.

For information or engineering assistance in equipping your future ships, write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.



GOODYEAR

EVERYTHING IN RUBBER FOR THE AIRPLANE

PERSONAIRLITIES



BY
by Caldwell

THE portrait of me that formerly embellished this page was executed years ago by Bill Heaslip. I was only six years old at the time. He caught me when I was smiling happily at the whippet races around Grant's Tomb. It was a good likeness, but I gradually outgrew it and my Little Lord Fauntleroy suit. Bill, noticing how I had deteriorated during the years, asked me to sit again. So I did, with the above result, which he sent to me with this letter:

"Dear Cy:—

"When you approved the portrait sketch I made of you, it became a complete success. It portrays an abundance of character—even without the lines of sin, helmet, goggles, Q. B. pin or what-have-you. I was sorry to neglect the white dot on your Dunhill pipe—you are so proud of both. It was a splendid chance to expose your noble brow and its crowning glory of kiss curls, spit curls and cork-screw curls.—Cork-screws are appropriate, anyway, atop of a lot of good old Scotch—ancestry.

"You were in a mellow mood that day in the studio, you approved the sketch and my expressed desire for bigger and better airplanes—better airplanes in aeronautical illustrations whether for stories or advertisements; and bigger and better returns for the artists who know their stuff. There is only one way to get the real spirit into flying pictures—and that is to have some real contact with the game.

"During the duration of the war I was a member of that honorable order, R.F.C.—R.A.F.—S.O.S.—JN4—ETC. I won two distinctions—I am one of the few who admits not having my quota of enemy planes—and I won my best pal and severest critic. There's three of 'em now—critics all.

"It is my desire to devote my entire time to the making of convincing and spirited illustrations of airplanes. I believe my best effort in the advertising field was in the recent colorful bird series called the 'Berryloid Fleet'. It seemed to cause favorable comments from all sides.

"The airplane industry has come to stay and I am staying with it. It is a splendid outlet for an artist who can successfully combine art and aviation activities with conviction.

"Yours
as you know me,
Bill Heaslip."

So far as I know, there are only two artists in America who can draw an airplane as it actually is—Bill Heaslip and Clayton Knight. Heaslip's Berryloid Fleet series and his excellent flying illustrations in various well-known publications, with Clayton Knight's spirited sketches in *Liberty* and other magazines, form the entire worthwhile contribution to American aeronautical art. Most artists, glancing cockeyed at an airplane, return to their studios and dash off undiluted rubbish. I have seen, in such periodicals as the *Saturday Evening Post* and *Liberty*, flying story illustrations that would cast no credit on a high school boy. Airplanes with square struts, no control surfaces, or control surfaces in the wrong positions, are standard.

Heaslip knows his airplanes for he has flown them, has been closely associated with the men in the aeronautical industry and is known (and liked) by the pilots who are leaders in their profession. I unqualifiedly recommend this talented former war pilot to the magazine art editors; they seem badly in need of artists who really have the "feel" of the air.



Bill Heaslip

HEART-RENDING cry from A. C. Pritchard of the advanced hamlet of Lancaster, California, home state of Dudley Steele, arbiter of fashion: "We completely rebuilt Scofield's Jenny last winter, and it is more airworthy than some new production ships. But it is impossible to license it on account of the bad publicity the newspapers have given all Jenny accidents."

The very youngest Jenny—the very youngest, mind!—twelve years old. You may give her new longerons, new glands, a new skin, and have her face lifted, but she remains twelve years old. Why should the Department license a partially rejuvenated old lady like Jenny? Pilots who moan that they cannot get an airplane license for a 1918 Jenny would be the first to laugh at someone going to City Hall to procure an automobile license for a 1918 Ford. Yet the only difference is that if the ancient Ford car falls to pieces it hasn't far to fall. The only sensible thing to do with an old Jenny or Standard is to take a photograph of it, paste the photo in your album to remind you of the good old days, and then set a match to the subject you have snapped.

BACK in the year 1850 there lived a gentleman with a nut idea. Gentlemen with nut ideas are not scarce in any age, but this particular gent was really outstanding back in 1850, because the particular nutty idea he cherished was considerably nuttier than any of the then prevailing nuttisms, or *nuttae*, as we Latin scholars say. Briefly, his idea was to fly from New York to Paris in a balloon, an ordinary round balloon resembling a grapefruit with a basket hung beneath it. His motive power was to be the wind, the soft western breeze. In fact, he had made such a study of air currents that the Smithsonian Institution had presented him with a medal in recognition of his researches into the antics of west winds. He had found, to his surprise and delight, that the prevailing winds were from the west—unless they happened to be from the north, south, or east. Hence, all one had to do was to suspend oneself by means of a balloon in the air and be wafted gently to Paris. There were more west winds than east ones, so in time one would cross the ocean.



Florence Barnes

The gentleman who cherished this idea was Professor T. S. C. Lowe, who later distinguished himself by becoming the grandfather of Mrs. Florence Lowe Barnes, otherwise and more usually known as "Pancho" Barnes. But in 1850 Pancho had not even been thought of, and all was peace among the house detectives in the Hotel Cleveland. Acting very skittish for a gentle-

(*Continued on next page*)

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ALCOA ALUMINUM

(PersonAlRlities continued)

man who was destined in time to become a grandfather, Professor Lowe continued his researches among the zephyrs the while he implored someone to buy him a balloon. They refused, and told him to be careful when he was walking in the park, on account of squirrels. This state of affairs continued until the Civil War was introduced as a topic of conversation in the South by a press agent for an Uncle Tom's Cabin show, which was written principally to elevate bloodhounds from the back alley to the stage.

At about the time the first bloodhound chased the first Eliza across the canvas ice of a one-night stand, Professor Lowe became civilian technical commander of the Union Air Forces in the Civil War, which consisted of a few observation balloons. During the war he made over 3,000 ascensions and enjoyed himself immensely, hoping all the time that he would eventually fly from New York to Paris. Unfortunately, however, he got married, and his wife put a stop to his flying. So he turned in despair to railroading, and built the railway up the mountain that is named after him—Mount Lowe.

And it is from old Prof. Lowe that Pancho undoubtedly inherits her love of the air. Her cousin, Harry Lowe Brownback of Brownback Motors, is also a descendant of the old Prof. So the air game runs in the family. Pancho (which is the Mexican nickname for Frank) was born in 1902 at San Marino, Calif., in the house in which she still lives. She learned to fly with Ben Catlin, soloed in September 1928, and has flown over 300 hours. She was in the Women's Air Derby from Santa Monica to Cleveland, but had an argument with a Chevrolet at Pecos. The Chevrolet won the decision over Pancho's Travel Air. She has a son seven years old and a husband, Rankin Barnes, who, she tells me, "prepares people for the next world." I'm not certain from that description whether he's a minister, a doctor, or an undertaker.

GENE SMITH of San Antonio sent me an account of the flying activities of Master Sergeant Ezra F. Nendell, now in Hawaii, who left Kelly Field with a record of over 12,000 miles a year for three years in mercy flights in the aerial ambulance of that field. Since Dec., 1925, he had piled up about 40,000 miles and 400 hours in mercy flights alone, which must be a record. He carried 38 patients, most of them air crash victims, to the hospitals. During the Mississippi Valley flood he saved the life of at least one patient, a little girl who was rushed from a refugee camp to a city hospital for an emergency operation. When Rock Springs, Texas, was razed by a tornado in April, 1927, Sergeant Nendell carried seven patients to hospitals in San Antonio. All lived but one, who died en route. The flight was successful but the patient passed away.



Master Sgt. Nendell

The aerial ambulance is a valuable aid to life-saving when time is a factor. Planned for army use, it is available for civilians only in cases of extreme urgency. It is especially valuable in the event of crashes that occur on farms or isolated ranches not easily accessible to automobiles. In such instances the air ambulance lands as near the crash as possible; the pilot and flight surgeon place the patients in the ambulance and speed to the nearest hospital.

DID you ever hear of a pilot worth $500,000—outside of Lindbergh and Casey Jones? According to a Curtiss catalogue of OX-5 parts, list price, that's what Bob Lowell was worth one time, some years ago, he says. He isn't worth quite that now, and still has to work. But in those days he "bought three carloads of OX-5 parts from Willys Morrow Company and shipped them to Oberlin, Ohio, my base. Packed these precious parts away in an old barn, took an inventory and found that they amounted to over $500,000, Curtiss list price. Advertised in various magazines, expecting to be rushed with mail orders. But much to my surprise, all the OX's seemed to be running perfectly, and needed no parts. Then, just as I was beginning to sell some good orders to other dealers, along came a nice fire which destroyed the barn and my dream of wealth."



Bob Lowell

Lowell spent two years in the Army, starting flight training at Mineola, and finishing up as a pursuit pilot with nothing to pursue, for they forgot to send him across. The War Department left him stranded in the Florida swamps in October 1919, so he organized the Dixie Aerial Service at Sanford, Florida, the service having been supplied reluctantly and slowly by a Jenny and a Canuck. The winter influx of northern pilots, willing to fly for next to nothing if only they could lie out in the sun, drove Bob north, where he became the millionaire parts purveyer of Ohio until the fire released him. Then he barnstormed around West Virginia, Kentucky, Maine, and New York; tried to put aviation across in Maine by starting a school, which blew up; helped Chas. Prohinsie sell Wacos at Curtiss Field; and took out the World's First Flying Orchestra to tour the U. S. A. However, four airplanes, five pilots, twelve musicians, and two automobiles blow more money on getting around the country than they can blow back into the treasury by playing for dances, as anyone with a pencil and paper could have told Harry MacDonald before he started. So all that went pffft, and Bob went south to Georgia where he flew an Eaglerock carrying passengers. After which he went to Dearborn, hid himself in the Ford factory for a time learning to join Fords together, and finally flew them. All of which goes to prove that if you want variety, get into aviation; if you want money, rob a bank.

PILOT LOUIS F. BURR of Hanford, Calif., tells a sad, sad tale: "Flying a Monocoupe, I had taken off with a passenger and was up about 800 feet when I heard a terrific banging and knocking in my motor. I looked forward and saw No. 4 cylinder flop up and hit my propeller, breaking it. I cut the switch and the motor immediately froze. Spotted a plowed field and set her down all right. I found that a connecting rod had broken and gone through the crankcase, breaking off a cylinder at the same time. We dismantled the plane, took the wing off and were trucking it to the airport when it suddenly caught fire and completely burnt up. So now I am minus a wing and a motor. Can you suggest any way in which I can get the remainder of this Monocoupe to go up?"

Well, you might try a match.

EARLY BIRDS

THE first time I saw Anthony H. G. Fokker he was having his picture taken, and the last time I saw him he was having his picture taken, and all the times in between when I caught a glimpse of him he was also having his picture taken. A camera seems to be an integral part of any scenery Uncle Tony adorns. It's always there, and if it wasn't there, Tony would miss it. If he ever goes into the movies he'll screen very naturally. He's been photographed as often as Niagara Falls, and has got the photograph in newspapers much oftener than the Falls.

All of which is good business. The round, amiable face of Tony Fokker is as well-known as the bearded countenances of the two Smith Brothers, Trade and Mark. I don't know when Tony first hit on this picture racket, but he was an old hand at it during the first Ford Reliability Tour, when the papers used to print a little picture of the tour planes and a big picture of Tony—you'd see Tony right up front, and way in back of him, scarcely visible to the naked eye, the flock of planes. And if any plane did get a full-length picture of itself in the paper, it usually turned out to be the Fokker trimotor. Or if it was some other plane, it was labelled FOKKER, anyhow. People got the idea that Tony either built all the planes in the tour, or else stood in front of them so you couldn't see them.

Anthony Fokker was born April 6, 1890, at Kaderi, Java, Dutch East Indies. The world paid practically no attention to the fact so the infant Tony left Java flat and went to school in Haarlem, Holland. There wasn't a camera man in the school, so Tony left at an early age and asked his father to

(Continued on next page)

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(PersonAlRlities continued)

buy him a plane. His father said he was willing to give him a V. P. K. but not a plane, so Tony built his own in 1911, almost entirely with his own hands, and taught himself to fly. With that plane he won the Russian military aviation competition at St. Petersburg in 1912.

That year he offered his planes to the British, Dutch, and French governments; but you know what governments are. They all refused, of course, and then spent the next seven years kicking themselves lightly about the legislative halls. Because Germany in 1912 offered the designing genius a three-year contract, as a result of which they were able to battle practically the whole world much longer than they would have been able to do it if Fokker hadn't been with them. For he directed the construction of some 8,000 war planes for the good old firm of Bill Kaiser & Co., thus setting up some excellent targets for Eddie Rickenbacker, Elliott White Springs, and a few others. The peculiarity of the Fokker pursuit planes was that they were usually a little ahead of the Allied production; while the Allies were designing something to beat the Fokker at that moment in the skies, old Tony was laughing quietly while he produced something that not only could beat his previous Fokker, but also could beat whatever it was the Allies were designing to beat it. And while Allied materiel sections were busy dictating to the airplane factories and pursuing a policy of obstruction, Uncle Tony was going along gaily with production, and walking to the bank each Saturday with a large deposit. A picture of Tony enjoying the signing of the armistice would be a rare work of art. And who can blame him? He was a neutral, quite impervious to the hysteria that gripped the combatants and turned them into ninnies.

However, the armistice did break forth in all its fury, driving Tony back to Holland, where in his plant at Amsterdam he continued to deluge the world with Fokker planes for commercial uses, later coming to the United States, curious to see a country that could produce two such wonders of nature as Niagara Falls and Andrew Volstead. The Fokker Aircraft Corporation now has factories at Hasbrouck Heights and Passaic, N. J., and at Wheeling, West Virginia, about which flits the rotund form of genial Uncle Tony. And over the busy scene broods forever and always the benign spirit of photography; there the camera man lurks ready at a moment's notice to leap out and imprint upon film the countenance of Mr. Anthony Fokker, with which to gladden the eyes of the world.



Anthony H. G. Fokker in the early days

THE man who fired the first machine gun ever fired from an airplane in flight started something. Although I piloted an airplane from which a great many thousands of rounds of machine gun ammunition were discharged during the war, and although many millions, perhaps billions of rounds have been discharged from airplanes during and since that war, it had never until now occurred to me to wonder who had fired the first shot. I sort of took it for granted that everybody just went up and started shooting, but when you come to think of it, there must have been one particular man who was first. There's always a first in everything. Who, for instance, was the first man to eat an oyster or a lobster? He was a brave man, whoever he was. And the fellow who first discovered that tripe was eatable—if it *is* eatable—who was he? Some starving man, I reckon. And it must have been some famished individual who tried liver for the first time, and caviar, and Limburger cheese. What, I ask, must have been the mental reactions that could induce a man to tackle Limburger? Perhaps he had a bad cold, or just didn't give a damn.

Well, the names of those fellows are hidden in what they call the mists of antiquity, which are thicker than the Pittsburgh atmosphere on a rainy day—or what passes for atmosphere in Pittsburgh on a rainy day. But the name of the first man to fire a machine gun from an airplane has been discovered, at vast expense, by this antiquarian. He was Captain (now Lieut.-Col.) C. deF. Chandler, U. S. Army, Retired—which is just as well, in case he kept on and discovered something even worse. The fatal day was May 7, 1912, and the place was College Park, Maryland. The gunner was Captain Chandler, the pilot, Lieut. T. W. Milling, and the airplane a Wright of the 1912 vintage. In the accompanying photo you may observe on the gunner's face a placid expression, denoting that he hasn't the least worry about what he is starting; in fact, he looks quite content about it. I suppose the man who invented liverwurst was equally unconcerned. The pilot with him is Lieut. Kirkland, who didn't go on the flight. He was just sitting there to have his picture taken.

Colonel Chandler, who is now aeronautic editor of the Ronald Press, started out like many of the Early Birds, in a balloon. On October 22, 1906, he rose slowly and with dignity into the air above Pittsfield, Mass., on the inauguration of free ballooning as a sport in this country. Since that time he has made over 500 voyages in free balloons, which are the world's only one-way traffic vehicle. They'll only go down-wind. And do you notice the girls never go ballooning? They know they'll have to walk back.



Capt. C. de F. Chandler, Lieut. Kirkland, and the first airplane machine gun

Colonel Chandler qualified as a spherical balloon pilot in 1907, F.A.I. Certificate No. 8, when he was first Chief of Aeronautical Division, Office Chief Signal Officer of the Army. He was the first winner of the Lahm trophy for ballon racing in October 1907. In 1908 he made a number of flights as pilot of U. S. Army Dirigible Balloon No. 1, from Omaha, where he designed and supervised the installation of the first large capacity electrolytic hydrogen plant. He was a member of the board that conducted the official trials of the Wright brothers' airplane at Fort Myer, Va., in 1909 and made his first airplane flight as a passenger with Wilbur Wright in October 1909. In June, 1911, he was assigned as Commanding Officer of First Army Aviation School at College Park, Md., and qualified as an airplane pilot receiving F. A. I. Certificate No. 59. Then he went to Dayton for advanced instruction under personal direction of Orville Wright. During the World War, fought for the advancement of U. S. Steel Common, Colonel Chandler was Chief of the Balloon Division and in October 1917 went to France to erect stationary targets for German scout planes. Most of these targets were successfully destroyed by the gleeful enemy, while the startled artillery observer parachuted earthwards. For his service in France Colonel Chandler received the Distinguished Service Medal (U. S.) and grade of Officer in the Legion of Honor of France. After the war he was Chief of the Balloon and Airship Division, Office Chief of Air Service, in Washington, until he was transferred to the retired list in October 1920. He is the author of two books on aeronautics: "Balloon and Airship Gases," and "Free and Captive Balloons." He is a leading authority on gas, having spent so much of his life near the U. S. Senate and House of Representatives.

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AIRPORT AND AIRWAY

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Tulsa—World's Busiest Airport

By

Kent Sagendorph

A FEW years ago, authors of books on the air transport industry were fond of picturing the airport of the future; great passenger air liners arriving and departing on split-second schedules, luxurious terminal buildings filled with sky-line patrons, complicated dispatching and field management equipment, and so forth. We who follow the progress of the air transport industry have read all these things many times, but for some reason they have continued to be visionary prophecies and future possibilities—never seen in fact in this country. European airlines, subsidized by national treasuries, forged ahead and realized some of these dreams; built great, solid-looking terminal buildings and handled many thousands of airline passengers. Returned Americans were fond of saying that the great air terminal at Tempelhof, Berlin, was the most modern and best equipped; that more transport planes arrived and departed at Le Bourget daily than at any other, and that Croydon had the most precise, business-like traffic control system.

These three air terminals have led the world in volume of traffic and organized airline activity for some years. It is only natural that Americans have come to have an exaggerated idea of their operations and magnitude. The opinion has been expressed freely that America would require many more years before it could produce an air terminal which would rank with this European trio in importance. Therefore, it should be a source of national pride to invite international attention to an American municipal airport which handles more airplane and passenger traffic daily than any of Europe's best airdromes. Tulsa, Oklahoma, now has the busiest airport in the world.

The equipment at this field is adequate to take care of its traffic, although not so spectacular as the prophecies made in the air transport volumes. It handles so many airplanes, passengers, buses, sightseers, charter planes and private planes a day that a code of traffic rules had to be worked out from experience, not from theory. There are six organized airlines using the port's facilities at present, in addition to considerable private airplane traffic. Forty passenger airliners come and go every day—of which twenty-two are trimotored. And last month it handled well over 10,000 passengers, a record that is unsurpassed even in Europe.

Getting a transport plane loaded and off before an incoming plane can taxy up to the passenger entrance is a much more complicated process than it sounds. C. W. Short, Jr., manager of Tulsa Airport, has had to develop means of accomplishing this move, as well as keeping the many air mail planes which use the port out of the range of passenger planes. He must see that passengers bound for Wichita do not climb in the plane bound for El Paso. He must also straighten out traffic tangles in the rear of the passenger terminal, where a dozen buses often arrive at once. His assistant, Mr. Barnwell, must keep traffic on the field running smoothly and endeavor to keep impatient private pilots on the ground until the heavily-loaded passenger plane just coming in has had a chance to land.

Mr. Short apparently has a much more acute problem than that which prevails on any of the three above-mentioned European fields, because there are more arrivals and departures daily at Tulsa and more passengers to handle. In addition, there are probably a great many more private craft buzzing about Tulsa than are found at any of the great airports of Europe, where private flying is quite limited and aviation is almost entirely a transport venture.

One of the chief reasons for Tulsa's rapidly growing air traffic is that it has good flying weather during most of the year. While Tempelhof, Croydon and Le Bourget are idle for days and sometimes weeks in the icy grip of blizzards and winter storms, Tulsa Airport basks in the Oklahoma sunshine. Another important reason, of course, is that Tulsa is a natural division point on several long air routes. It is about half-way between New York and Los Angeles via the southern route, and passengers can transfer easily from local airlines or from trains and board the swift cabin planes of Southern Air Transport, Western Air Express, Universal Air Lines, Southwest Air Fast Express and other lines, to complete journeys to east or west. Los Angeles is twelve hours distant by air, and New York will be about the same as soon as National Air Transport inaugurates passenger service on its lines.

Most of the great airlines from St. Louis and Kansas City going south pass through Tulsa. The routes from Southern California via El Paso also terminate at this point. In addition, Tulsa is the center of a rich oil region and all the oil-producing and pipe-line companies own from one plane to a whole fleet, which adds to the traffic problem. Many ranchers and drilling foremen in the district use private planes; owners of property in this region are using the airplane as a vehicle in greater numbers than Easterners realize.

Therefore, at Tulsa Airport, you will see not only white-collared business men stepping from trimotored passenger planes, but flannel-shirted and Stetson-hatted ranchers and oil men throwing a leg over the side of a small biplane with the same enthusiasm they mounted a spotted horse a few years ago.

Canadian Terminals for U. S. Airlines

AT THE present time, there are several new companies entering the air passenger field and a number of established lines are extending their terminals into new territory. Such extensions are the

(*Continued on next page*)



Spanish type of administration building at the United Airport. Planes in the foreground are Boeing 40's, four-passenger Hornet-powered ships in use on the Boeing Seattle-San Diego Line

LIKE SUPER-HIGHWAYS

are the Runways at United Airport



AT this famous airport giant transport planes that weigh upwards of 20,000 pounds land at sixty miles an hour . . . yet alight gently . . . and with the safety that comes of perfect runways . . . three hundred feet wide, with straight-aways of 3600 feet, these runways like super-highways provide perfect access to the sky, and safe harbor for incoming ships. In detail or aggregate, this airport compares favorably with any in the world. Seven months' time was sufficient to transform 240 acres of vineyard and dry river bed into a model airport . . . sufficient to equip it with abundant ground facilities, industrial plants, paved roads, lighting, and attractive landscaping . . . and a terminal building of modified Spanish architecture executed in a design beautifully appropriate to flight . . . this unusual performance which included complete layout, design, construction and equipment was made possible under the Austin Method of Undivided Responsibility.

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(*Continued from preceding page*)

result of a long period of planning, survey and investigation, in which the new terminals have been subjected to exhaustive analyses from a traffic standpoint and their potentialities estimated as closely as possible. Yet, with all this activity, why do so many airlines neglect the tremendously important agricultural provinces of Canada, where surface transportation to the United States is often lacking entirely or available only by long and circuitous routes.

There is nothing particularly complex about a Canadian-U. S. international airline, as Canadian Colonial and Northwest Airways have discovered. The former has carried passengers and mail between New York and Montreal for three years, and outside of the fact that a customs official inspects the passenger at Montreal and Albany, there is no difference between this line and a purely domestic run. The latter recently announced an extension of its Chicago-Twin Cities route to terminate in Winnipeg, the center of a rich agricultural region in Mantoba province. It shows every sign of success.

These two lines are the most important arteries now connecting Canadian cities with the United States by air. There are, of course, two short-line routes; Seattle-Vancouver and Buffalo-Toronto. Thus, we have an unbroken sweep of a couple of thousand miles from Toronto to Vancouver, broken only by the line connecting Winnipeg to Minneapolis and St. Paul.

Between Winnipeg and Vancouver lies a huge reservoir of progressive Canadian citizens. The distance between the two points is more than 1,500 miles, and yet there is almost no way to visit the United States from this region without passing through either Winnipeg or Vancouver. Railroads run east and west both in Canada and in the United States but do not cross the border.

Nearly in the center of this 1,500-mile stretch is Calgary, the metropolis of the wheat region, with nearby mountain lakes famous all over the world as summer colonies. This is the so-called "Canadian Northwest"; Banff, the biggest tourist center in Canada, is a scant few miles from Calgary itself. The biggest wheat ranches and the wealthiest ranch owners all congregate near Calgary. And yet, in order to travel to the United States, they usually go to Winnipeg or Vancouver on the fast Canadian trains and back to their destination on U. S. trains. This is a detour of as much as 1,500 miles.

National Parks Airways, Inc., maintains a daily service from Salt Lake City to Great Falls, Montana, via Pocatello, Idaho, and Butte and Helena, Montana. Its terminus is only about 300 miles from Calgary. It would seem that it could extend its service to Calgary without much expense or preparation, and thus tap the Northwest's richest agricultural and tourist region, beside giving the Canadians an opportunity to connect with Boeing planes at Salt Lake City for a swift flight to Chicago and New York. It would save such passengers literally days in their trips.

The residents of Calgary will eventually find means to fly southward into the United States to avoid the long railway journeys, and the N. P. A. line is in an excellent position to obtain this traffic. A direct service from Salt Lake City to Calgary would ultimately prove a valuable addition to the airway map.

A Railroad Man Views the Air Terminal

MR. C. B. SUDBOROUGH, an official of the Pennsylvania Railroad, made an informal address to the Second National Airport Conference in Buffalo, recently, in which he said several important things about transportation in general and the terminal's place in air transport. He started off on a business-like talk, but apparently his subject was so interesting to him that he digressed a bit and gave his hearers the intimate reaction to aviation of a man who has spent a quarter of a century in studying railroad traffic.

One of the first major problems of any sort of transportation, he said, is that concerning terminals; solving problems arising from lack of facilities or from some architect's faulty design. He told about the early railroad stations that squatted beside the track, and their successive progress to the marble and steel monuments of the present day. He said that the airlines, if they chose, could have all the experience amassed by railroads and steamship lines for a century past, and that there should be no excuse for delays or confusion in airport passenger terminals after the lessons the railroads had learned in the art of handling terminal traffic.

Then he remarked that the air transport industry has been entertaining some mistaken ideas about traffic management, and that it has just begun to get over some erroneous notions concerning the operation of the lines themselves. A few years ago, he said, the public thought that to establish an airline, all that was necessary was to buy an airplane and sell tickets; that because there was no right-of-way to purchase or roadbed to build and maintain, everyone thought that it would be a great deal cheaper to inaugurate an airline than it actually is. In this connection he told of the Pennsylvania's collaboration with T. A. T., and how, when the airline was finally ready to carry passengers last July, it had five-sixths of its total capital invested in ground equipment and only one-sixth in flying equipment. So that, after all, the airplane is the cheapest part of the whole affair.

This illuminating address ought to be a revelation to those persons who have to be shown why it costs money to run an airline. Think of this five-to-one-ratio the next time you hear of an airline raising fares because of increased terminal expenses.

Mr. Sudborough continued by advocating the special-purpose airport for passenger traffic only, and equipped solely for this purpose. He also favors the aid of cities in their own airport maintenance, which, he said, is too costly to be borne by the airlines themselves at this stage of their development.

Most of us are inclined to agree with Mr. Sudborough in his contention that passenger air transport should have its own terminals at special airports. We know that the hodge-podge of aerial activity over a field is confusing and dangerous and leads to delays and traffic congestion. This is only another instance of how the air transport industry, growing from a promising start toward larger and larger traffic volume, may find in the experience of old-time railroaders suggestions to help solve its newer, but similar problems. Mr. Sudborough advocated three important changes in present-day transport procedure; special airports for passenger traffic, municipal assistance in airport maintenance, and well-designed, attractive and comfortable airport terminals. He has had enough experience in railroad work to know whereof he speaks, and wise listeners at the Airport Conference carefully noted his recommendations.

AIRPORT AND AIRWAY DEVELOPMENTS

Mr. Barnwell on Subsidized Airports

THE assistant manager of the Tulsa Municipal Airport which we discussed above, Mr. William Barnwell, has raised a question which has been allowed to become very acute in many sections of the country. He wrote a letter asking us to shed light on the status of a municipal airport and whether or not it should be self-supporting. It is difficult to answer Mr. Barnwell's question until I know how this matter affects the airport managers of the country, and I therefore refer it to the readers of the Airport and Airway Section for comment.

"The question," says Mr. Barnwell, "does not seem tremendously important in itself, but to the airline operator and the municipal airport, it means hundreds of thousands of dollars yearly and will soon mean millions yearly, no doubt. At the present time there are two types of municipal airports; the type which leases plots and hangar sites to the operators at a dollar a year for fifty years, makes no commercial operation charge and sells its commodities at or as near cost as possible. Then, on the other hand, there is the airport which leases its plots and hangar sites at a figure proportionate to their value and sells supplies at a legitimate profit. This dual condition cannot survive indefinitely. One class or the other must give way."

Naturally, the airport which leases space for a dollar a year will be more popular with pilots and operators. But the attitude of many airport managers and city officials is that the airlines are commercial organizations and, if they are to survive, must eventually show a profit, as we hope most of them will in 1930; hence there is no reason why they should not pay a fair price for space and supplies. Both sides, I admit, have strong and convincing arguments.

Mr. Barnwell furnishes an actual case which shows the discrepancies that can exist between one policy and the other. He

(*Continued on next page*)

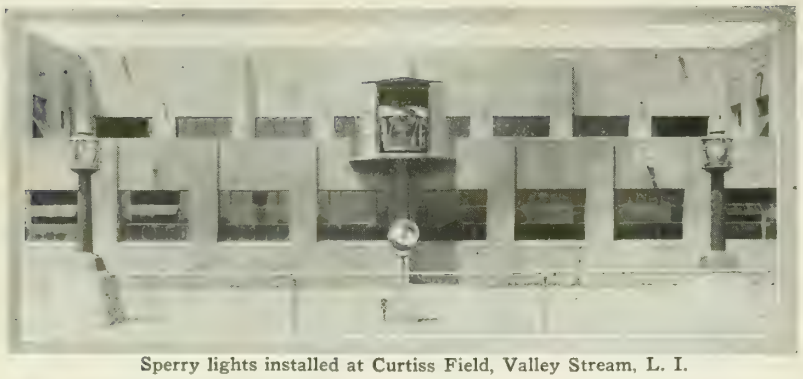
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Sperry lights installed at Curtiss Field, Valley Stream, L. I.

(Continued from preceding page)

mentions a certain airline which runs between two cities several hundred miles apart. At each of these airports the line has built hangars, and is running a daily schedule of four planes in each direction. At one of these cities, *A*, the monthly rental and operation charge amounts to eight cents. At the other end, *B*, the monthly operation charge, rentals and gasoline tax amounts to $190.

City *A* voted bonds each year for the operation and maintenance of its airport, and the only charge made to the airline is the dollar a year rental for the hangar site. Gasoline is purchased directly from the refinery without airport tax, and no operation charge is levied. City *B* has a different airport policy and charges a rental of $50 a month on the hangar site; operation charge is another $50 per month; and a tax of two cents per gallon is collected on all fuel brought on the field. Thus, we have a fair idea of how that airline operator regards the two cities, *A* and *B*, and their respective airport policies.

Mr. Barnwell states that, although city *B* charges for its facilities, it extends the use of its ticket office, waiting room and other services free. The tax is levied on gasoline to protect the city's investment of $15,000 in fueling equipment against heavy competition. Further, this $190 is the smallest item in the airline's budget, equaling the salary of a second-rate mechanic.

In summing up the situation, we can only go back to the original question and ask for statements from the industry. Is the municipal airport to be self-supporting or should it be subsidized by the city?

Department of Commerce Airways Program for the Next Fiscal Year

PROVISIONS to establish twenty airways radio stations, 3,000 miles of lighted airways, more weather broadcasting stations and extension of the teletype service are included in the program for the Airways Division, Department of Commerce, for the next fiscal year, according to Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

There will be, upon completion of the present plans, 17,500 miles of Federally lighted airways, sixty-five weather broadcasting radio stations and 8,500 miles of teletype service. Radio beacon service will likewise be developed during the coming year until about fifty per cent of the lighted airways will provide this important aid to navigation.

Work to Start on Easton Airport

THE International Airports Corporation, New York City, has just signed a contract with the Easton Airport Corporation, Easton, Pa., for the construction of a major commercial airport at the Pennsylvania city. The ultimate expenditure of $500,000 will be made in the construction of this project, which is to serve the cities of Easton and those in the surrounding district. Work is to start immediately. The International Airports Corporation will also act as operating managers of the port.

New Curtiss Floodlight Installation

THE accompanying photograph shows new floodlight installation at Curtiss-Wright Airport, Valley Stream, Long Island. The main unit is a 1,000-mm. high-intensity type light and the two auxiliary floods are of the 500-mm. incandescent type. The installation is said to provide the airport with one of the best lighting installations in the country.

We have recently learned that the Greenville Airport Commission, of Greenville, S. C., has contracted for a complete lighting equipment for the municipal airport, consisting of a 1,000-mm. arc floodlight, motor generator equipment, revolving beacon, ceiling light, boundary lights and obstruction lights, together with special transformers and the necessary auxiliary equipment. Both installations are from the shops of the Sperry Gyroscope Co., Long Island City, N. Y.

Notice to Pilots—Ayer, Mass.

CAMP DEVENS, Mass., located near Ayer, reports that its landing field is in bad condition and dangerous for use by Service-type planes. It is covered by Aeronautics Bulletin No. 246. C. S. Kempff, Captain, U. S. Navy, advises that all planes refrain from landing there.

Canadian-Colonial Flare System

UNTIL the new Department of Commerce radio weather stations now under construction at Albany, New York, and Montreal are completed, planes of the Canadian-Colonial Airways flying on this route will be notified of bad weather ahead by means of a system of flares.

A pilot seeing one flare at certain points on the route is notified that he will encounter bad weather ahead, while two flares instructs him to land at once and three flares means return to the base.

The system was devised by Earl Ward, operations manager of the system, and Capt. Hale Francisco, chief pilot on the Canadian-Colonial line. The flare stations have been installed at intermediate fields located at New City, Poughkeepsie, Albany, Burlington and Plattsburgh. Recent tests and one demonstration wherein a passenger ship was sent back to Montreal point to the success of the new system.

More Land for Boston Airport

GOVERNOR ALLEN of Massachusetts recently signed a bill permitting the State's Department of Public Works to lease additional land to the City of Boston for the development of Boston Airport. This makes possible the immediate development of the airport to the minimum requirements of a Class 1 ruling on size from the Department of Commerce and permits an almost unlimited expansion as fast as it becomes necessary to handle the increasing traffic.

Boston Airport is built upon filled land immediately adjacent to the main ship channel and about a mile and a half from the main postoffice. The developments planned for this year will give incoming planes clear approaches over water from all directions except the north, which, according to statistics, is very seldom used.

Airport Drainage and Surfacing Committee Announced by Col. Young

THE absence of uniform and thorough application of adequate drainage and surfacing for airports has led Col. Clarence M. Young to announce a new committee formed to study these problems. Three organizations will be represented on the new board; the Department of Commerce, Aeronautics Branch; the American Road Builders Association and the American Engineerng Council, the latter two of which have technical resources which will be used in the work.

The committee, of which Col. Harry H. Blee is chairman, will undertake to collect and organize all possible data and experience, and present its findings in a report which will be used by engineers engaged in the development of new airports. It will also endeavor to meet the constantly increasing demand for information on these subjects.

Light-weight, Fireproof Roof Tile

A NEW roofing material of interest to hangar and airport engineers, known as Feather-weight Concrete Insulating Roof Slabs, has been announced by the Federal Cement Tile Co., Chicago, Ill. These slabs, containing air cells in fireproof insulating material, weigh ten pounds per square foot, and are strong enough to go on the same light steel frame that carries other roofs. Numerous installations, including the Wayne County Airport, Detroit Municipal Airport and others, have been made.

(*Continued on next page*)

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ROBIN—3-place Challenger engine, D. C. No. NC92H, 236 hours, Detroit Base $4,215

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CESSNA—4-place Warner engine, D. C. No. C9858, 174 hours, Memphis Base $3,180

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COMMANDAIRE—3-place open biplane, 165 Whirlwind engine, D. C. No. NC977E, 49 hours, Kansas City Base $4,775

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WACO—3-place open biplane, Siemens-Halske engine, D. C. No. NC9513, 254 hours, Rockland Maine Base $2,800

+

MOTH—3-place open biplane, Gipsy engine, D. C. No. NR857H, 140 hours, St. Louis Base $3,700

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PORTLAND	Maine
RALEIGH	North Carolina
ROCKLAND	Maine
ST. LOUIS	Missouri
SAN FRANCISCO	California
TOLEDO	Ohio
VALLEY STREAM	New York

(*Continued from preceding page*)

NEW COMPANIES AND MERGERS

Washington-Philadelphia-New York

EVERY Hour, on the Hour, in One Hundred Minutes," is the slogan of a flying service to be inaugurated between New York, Philadelphia and Washington on August 15th. It is the first airline in the East, operating out of New York City, to offer an hourly service to other cities; it is likewise the first to use the new Stinson ten-passenger trimotors for passenger carrying, and it marks the first time a woman has been mentioned as vice president of an air transport company.

The organization is known as the New York - Philadelphia - Washington Airways, Inc., and has a capitalization of $1,000,000. C. T. Ludington, well-known in Philadelphia flying circles, is chairman of the board; his brother, Nicholas Ludington, is president, and Amelia Earhart, is vice president. Other famed names appear on the roster, among them Paul F. Collins, R. Sanford Saltus, Jr., Walter L. Morgan and Charles C. Savage, Jr.

The Ludington brothers have had several years of extensive experience in airline operation and management, and should be thoroughly at home in the new venture. C. T. Ludington has been a vice president of N. A. T., chairman of the governing board of Central Airport, Camden, chairman of the Ludington Flying Service, a director of the Aviation Corporation and other enterprises. The operating personnel has had many years of experience with famous operating organizations in the field of air transport.

The operating schedule of the new organization shows that ten trips will be made daily in each direction, all of them during the day. The flying time is an hour and forty-five minutes; elapsed time is only two hours and thirty-five minutes, including the trip from airport to downtown points at both ends.

The New York terminus is to be Newark Airport; at Philadelphia Central Airport at Camden will be used. The Ludington brothers control and operate this airport and one of their officials, Mr. Saltus, is a director. At Washington the planes will land at Washington Airport, adjoining Hoover Field and located within a few minutes of the Capitol.

This announcement marks the first serious attempt to compete with railroad traffic between three important centers of population. Both the Baltimore and Ohio and the Pennsylvania Railroads operate hourly schedules from New York to Washington, and make the trip in about five and a half hours. The fare on the train is approximately eight dollars, and we are informed by Miss Earhart that the airline fare will be "slightly more," probably in the neighborhood of ten dollars.

The hourly schedule, however, is the chief feature of the new line, and represents a big step forward in the air transport industry. Paul Collins, who is operations manager of the new line, must keep the Lycoming-powered Stinson trimotors in the air from dawn to dusk; and his previous responsibilities with the N. A. T. mail planes and the T. A. T. Fords, and before them the DH's used on the Government air mail line of which he was superintendent, will supply a good background of experience for this venture. If he can keep up the ten-trip schedule, the line ought to be a success, because the potential traffic exists and the Ludingtons have an expert corps of agents to lure it in. Mr. Collins is one of the best-qualified men in the country to attempt this task, and the best wishes of the air transport industry attend him in the new venture. Next month we hope to present more details of the line's activities.

Another N. Y.-Washington Line

WHILE the complex organization described above does not inaugurate its schedule until August 15th, the Eastern Air Express daily service between New York and Washington went into effect June 11th. The twin-motored Sikorsky plane *Northern Star* made an inaugural trip between Holmes Airport, the New York terminus, and Hoover Field, Washington, in an hour and fifty-five minutes. No data are available as to fares, frequency of service or the type of flying equipment used on the regular runs.

Industrial Relations Service Offered

A FIRM known as the U.N.E. Associates, P.O. Box, 86, Roosevelt, N. Y., has announced a consulting service on Industrial Relations available to manufacturers, dealers and aircraft operators. The services offered include selection of help, vocational survey, industrial training, plant research and stimulation of morale.

New Line Uses Lockheeds

A NEW passenger line has been inaugurated recently between St. Louis, Fulton and Jefferson City, Mo., using Lockheed Vega monoplanes and operating two trips daily, except Sunday. Capt. Phil Love, Lindbergh's associate pilot in his United States tour in 1927, and Harry H. Knight are active in the management of the new company, the name of which is Shelton-Jefferson Airways, Inc.

Chicago-Columbus Line Opens

KNOWN as Continental Airways, Inc., a new passenger line has made its appearance with a daily schedule between Chicago and Columbus, Ohio, via Dayton. It has been planned to connect with the various train schedules between Columbus and New York and Chicago toward the West, and planes leave Chicago at 2:45 p.m. daily, arriving at 7:05 p.m. for train connections to the Atlantic Seaboard. Westbound planes leave Columbus at 8:05 a.m., arriving at Chicago at 10:25 a.m., in time to make connections with the westbound planes for Kansas City, Dallas and the Southwest.

There is a difference of an hour in these schedules between apparent and actual flying time, inasmuch as the passenger passes from Eastern Standard to Central Standard time en route. This leaves the flying time in the neighborhood of three hours.

It is rumored that the company plans the extension of its services to St. Louis from Chicago in the near future. Also, it is said to be the intention of the Continental Airways to inaugurate a totally different route southward from Columbus, via Louisville, Nashville, Memphis, Jackson, Miss., and Shreveport, La., to New Orleans. The line which recently opened, and the proposed line to New Orleans, will act as feeder lines to the T.A.T.-Maddux system. Offices of the company are in Chicago.

AIR MAIL NOTES

Varney Adds Blind-Flying Plane

WALTER Varney, operator of the Salt Lake City-Pasco Washington air mail line, has undertaken the task of teaching his pilots to fly blind. He has ordered one of his fleet of numerous fleet of Stearmans to be rigged up with a sliding screen over the rear cockpit, by means of which the occupant of the cockpit may be entirely shut off from a view of anything except his instruments. The front cockpit has controls, and there is a speaking tube connecting the pilot in front with the one occupying the hooded compartment. It is, in essentials, a system much like the one used by Lieut. Doolittle last year in the Guggenheim Fund blind-flying experiments, except that it does not boast so many complex instruments.

The first pilot selected by Varney to try the device was Walter Case. With Case in the closed pit and L. D. Cuddeback, vice president, at the controls ahead, the ship took off on a test hop from the Vancouver, Washington, field, spiralled to 7,500 feet and set off on a compass course for Pasco. It flew for twenty minutes in this direction and then turned and flew back to Vancouver again. This was accomplished with the hood completely closed and Cuddeback entirely away from the controls. Pilot Case flew the ship completely blind except for what aid he received from his instrument board.

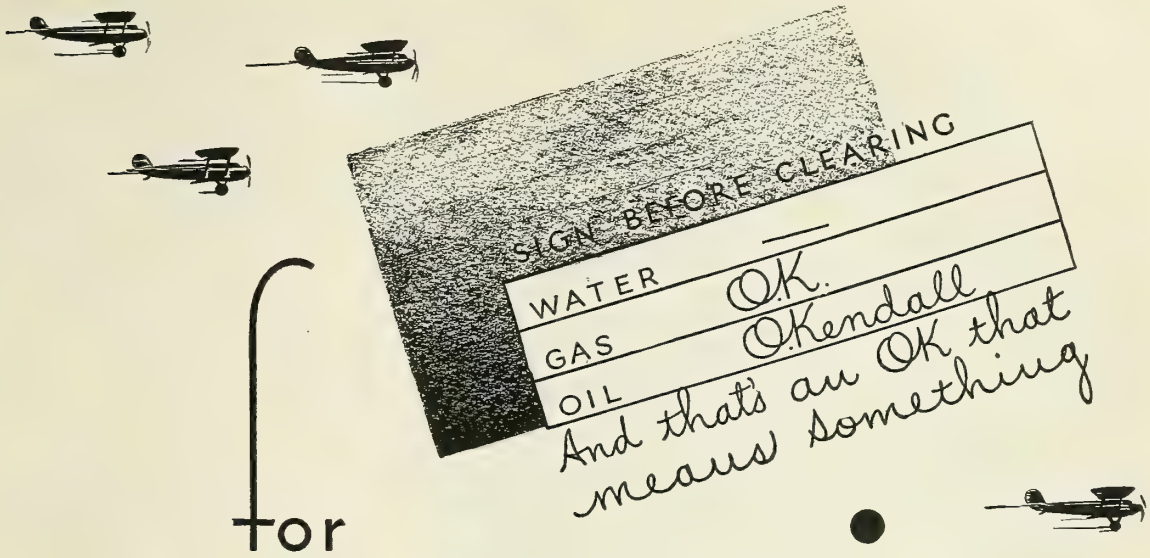
It is assumed that all Varney pilots will be given a course in instrument flying in the hooded ship.

Eastern Installing Radio

INSTALLATION of radio equipment in the mail planes belonging to Eastern Air Transport was begun recently when the first plane flew to Boonton, N. J., where the equipment will be installed by the Radio-Frequency laboratory.

The work on the first plane is under the supervision of F. E. Gray, Eastern Air Transport's radio engineer. This craft, which was flown to the laboratory by Pilot Walter J. Shaffer, is also equipped with the Sperry Artificial Horizon, and after the radio equipment is installed it will be used to instruct pilots in the use of radio beacons and the Sperry horizon, after which it will go back in service.

(*Continued on next page*)



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ACHIEVEMENT



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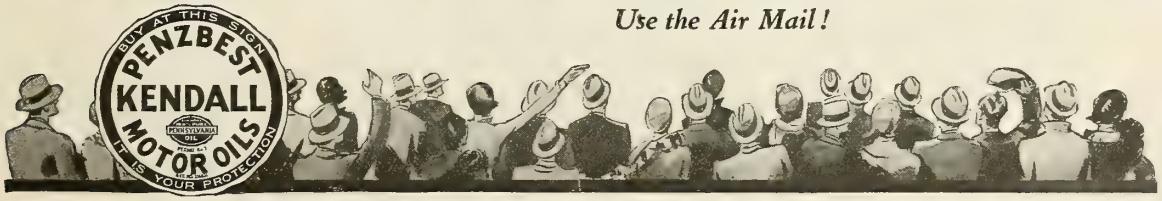
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(*Continued from preceding page*)

Poundage Increases Again

FOR the month of May, 1930, the total number of pounds of air mail carried by the various lines increased noticeably over the preceding month, according to advices from the Post Office Department in Washington. The amount of the increase was 15,662 pounds. Average for the month was 26,425 pounds as against 25,882 for the month of April.

Boeing again led the list with 159,540 pounds carried. N.A.T. was a close second with its New York-Chicago route showing a total of 142,396.

THE PASSENGER LINES

NYRBA Line Sets Passenger-Distance Record, Miami to Buenos Aires

THOSE advocates of air travel who say the airplane is at its best over long distances will be interested in the activities of the New York, Rio and Buenos Aires Line, which, during a recent month, carried 153 passengers over a scheduled airway 7,500 miles long.

The line has just completed a complex hook-up with the Pennsylvania Railroad, T.A.T.-Maddux Air Lines, the Seaboard Air Line Railway and several other American systems, by which it connects with their carriers at Miami and carries the passenger to South America. Therefore, by virtue of the new agreements, passengers may travel from all principal cities in the United States and Canada via the air-rail route and NYRBA planes to sixteen South American countries.

Most of the 153 passengers who made the long journey last month were engineers and business men, representing American firms. Thus the commercial use to which an air route of this character may be put is emphasized from the very beginning, and as time passes the commercial possibilities of the line will assist materially in its growth. At present, the company provides an eight-day passenger service between New York and Buenos Aires, cutting steamer time approximately one third. An even greater saving of time is afforded between some of the intermediate points on the route, where steamer schedules are intermittent and slow. It is interesting to note that NYRBA, on its entire system, carried 1,108 passengers between the lesser points on its routes during the month; an increase of about nine per cent over the month preceding.

Under the present schedule, travel between New York and Buenos Aires by train and NYRBA Line requires nine days; one from New York to Miami and eight from Miami to Buenos Aires. This compares more than favorably, however, with the twenty days required by boat, and the passenger is much more comfortable. He leaves New York on the Pennsylvania system and arrives in Miami, breakfasts on the train and drives in a private car to the international seaplane base at Cocoanut Grove. Here he boards the twenty-two-passenger Consolidated Commodore flying boats used by the line, and hops off for the West Indies.

The first day's flight extends to Port Au-Prince, Haiti, reached after stops in three Cuban ports. The second day he reaches Santo Domingo, the third at Georgetown, British Guiana. Then more stops are made at Para, Brazil, Fortaleza, Brazil, and Bahia, Brazil. On the seventh day the passenger reaches Rio de Janeiro, Brazilian capital. The trip from there to Buenos Aires is made in one day, with stops at Santos, famed coffee port, and Porto Alegre. Between these points, other planes of the line make local calls at forty-four cities in the West Indies and along the coast of South America.

The company's flying schedule calls for 102,000 miles of flying per month, which was performed last month on a perfect operating record.

Isthmian Airways Active in Panama

IF a New Yorker saw an advertisement for a non-stop, round-trip coast-to-coast flight carrying passengers for $12.50 each, he would think the aviation millennium had arrived. But in Cristobal, Panama, this offer excites no unusual interest. It is, in fact, being done every day.

From May 4th, 1929, to May 4th, 1930, the Isthmian Airways, Inc., whisked 9,000 persons across the Isthmus of Panama in less than half an hour per trip. Beside the regular passenger service from Cristobal, on the Atlantic side, to Balboa and Panama City on the Pacific side, the company offers a charter and sightseeing service which has, in the last year, proved decidedly popular. Passengers on steamships crawling slowly through the canal have found it a pleasant break in the monotony to disembark and fly across to the other end and await the steamer there. The time saved gives them ample opportunity to stretch their legs in long walks by the ruins of ancient Panama City or investigate the offerings of the numerous oriental bazaars which cluster in the narrow streets of Colon.

The line was organized a year ago when Capt. John H. Miller, an air mail pilot with many years of experience flying the Government route and later with private lines, arrived in Panama with a Hamilton metal monoplane which he was to deliver to an electric utility company in Colombia. He met Ralph Sexton, an oil company official, and the two decided to organize a trans-isthmian airline. Since that time the line has made 2,498 flights with no forced landings or minor accidents.

At the present time the line is operating between Cristobal and Panama City a daily passenger service with three trips each way, using Hamilton monoplanes mounted on floats and powered with Wasp engines. The charter service offered to tourists for sightseeing flights has accounted for many additional flying hours other than those spent on the regular scheduled runs. The fare across the isthmus is $10 one way and $15 round trip. Parties of six or more may make a non-stop round trip in a special plane for $12.50 each, as already mentioned.

Time required to make the trip by rail is about two hours; consequently, there are numerous cases of passengers and seamen from ships flying over the canal to catch their ship before it leaves; ship's papers and other documents which must catch a certain boat. Business during the first year of operation has been very good; so good, in fact, that the company is planning extensions of the service and improvement of the terminal facilities. An additional hangar is to be erected at Balboa, made necessary by the addition of several new planes.

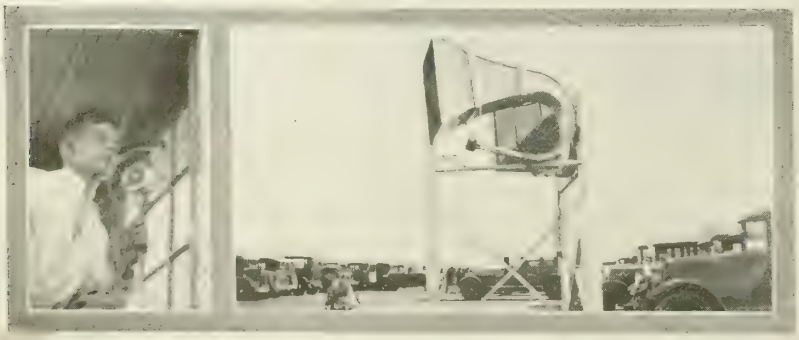
Slight Fare Increase on T.A.T. Line

ON June 15th the transcontinental fare for the New York-Los Angeles route of Transcontinental Air Transport-Maddux Airlines was boosted from $159.93 to $176.43; an increase of approximately one cent per flying mile. The schedules remain the same, and no other detail of the line's operation has been changed.

Last January when the fares on all the country's airlines were tumbling down like the stock-market quotations a month or so before, the opinion was expressed by many officials that the charges would go up again as soon as people had had an opportunity of tasting the advantage of air travel at a low rate. Most airlines freely admitted that they were losing money, even at capacity traffic.

It is only natural to assume, therefore, that after having operated the line at a losing figure to attract patronage, T.A.T. officials would raise fares enough to cover operating costs. No business enterprise can lose money forever. The new rate will probably spell the difference between red ink and financial security. Traffic has been running at capacity for so many weeks that the line feels that it has established a regu-

(*Continued on next page*)



Amplion horn installed at Roosevelt Field, L. I., to inform spectators of aerial activity on and above airport. Left, an announcer describing the flying through a microphone

The ROBIN

An all-purpose plane at a moderate price..



FOR EVERYDAY all-weather flying, the Robin continues as America's most popular plane. There is hardly an airport worthy of the name where Robins are not a familiar sight and always in demand. Built for hard service, they answer the needs of the commercial or private flyer with the same reliability that enabled the "St. Louis Robin" to win the world's endurance record by staying aloft 420 hours—a record which still remains unbroken after 12 months.

Pilots like the Robin's ease of control. They note, with favor, its low landing speed and economical fuel consumption. They appreciate its exceptional visibility, the efficiently arranged controls, and the instrument panel complete with every device to make flying easier and safer.

Passengers delight in the comfortable cabin, with its automobile-type doors and windows, its deep-cushioned seats, upholstered walls and carpeted floor.

Robin Prices Are Low

Robins values are outstanding for planes as finely equipped. Note these exceptionally low prices:

ROBIN 3-PLACE CABIN MONOPLANE with 90 h.p. Curtiss OX5 engine, speed up to 100 m.p.h., cruising range 456 miles **$2,495**

ROBIN 3-PLACE CABIN MONOPLANE with 165 h.p. Wright Whirlwind engine, speed up to 118 m.h.p., cruising range 438 miles **$5,995**

ROBIN 4-PLACE CABIN MONOPLANE with 185 h.p. Curtiss Challenger engine, speed up to 118 m.p.h., cruising range 525 miles **$7,995**

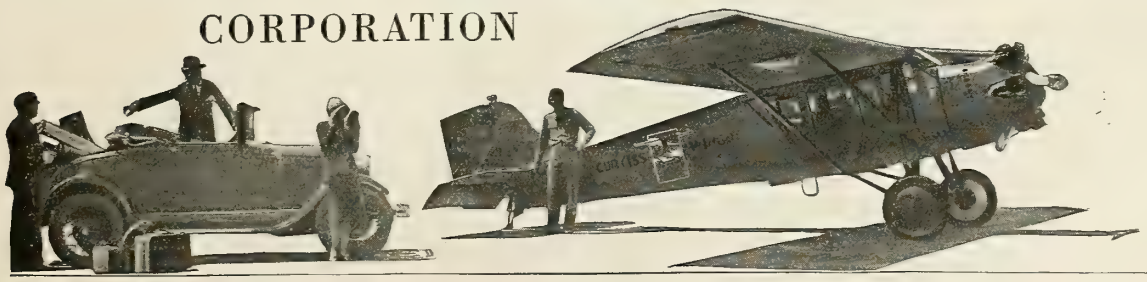
(This model equipped with dual controls)

◆ ◆ ◆

No need to put off for another year the pleasures and profits that may be gained now by the ownership of a Robin. Without cost or obligation, business concerns, commercial operators and individuals will be supplied with full details regarding the Robin, and a demonstration arranged. Address Dept. R-70, Sales Division, Curtiss-Wright Corporation, 27 West 57th St., New York.

CURTISS-WRIGHT

CORPORATION



(*Continued from preceding page*)
lar clientele which will not desert it even at a slightly increased fare.

When the figure given above is compared with the train-plus-Pullman fare of $162, and the forty-eight-hour T.A.T. schedule is compared with the five days and six nights required on the train, the increase seems to be justified. There is still a wide margin of speed and comfort over the offering of a straight railroad journey.

Thompson Adds Holiday Service

THOMPSON Aeronautical Corporation, operator of the Cleveland-Detroit amphibion passenger line, has announced that one regularly scheduled trip will be made each Sunday and two on all holidays except Christmas. The holiday flights will be made at 11:00 a.m. and 5:00 p.m.

In announcing the service, Mr. Richard C. (Tex) Marshall, general manager, stated that the company's decision to inaugurate the extra flight was the result of the great number of requests received from Cleveland and Detroit residents for such service. He stated that if the demand grew, he would add more holiday runs to the present schedule. Fares and flying time will remain the same.

Wedell-Williams Extends Service

THE Wedell-Williams Air Service, Inc., of New Orleans, has extended its airline system to include daily service both ways between New Orleans, Dallas and Fort Worth, using three new Lockheed Vega Wasp-powered monoplanes, recently delivered by the Detroit Aircraft Corporation.

This is in addition to the present two-plane-a-day service both ways between New Orleans, Baton Rouge, Alexandria and Shreveport, La.

The company claims to have the fastest daily schedule in the country, making the run between New Orleans and Dallas in less than four hours. The fare is $38.50 between Fort Worth and New Orleans, comparing very favorably with the railroad fare of $26.70. In addition, the schedule has been so arranged that passengers may make connections with the other airlines running to Oklahoma Falls, Oklahoma City, Tulsa and Wichita Falls, Texas.

Record Month For T.A.T.

REPORTS just compiled by T.A.T.-Maddux Air Lines show that during the month of May, 1930, more passengers were carried than in any other month since the company began to operate nearly a year ago. The final week in May likewise was the biggest week in the history of the company.

During the month, the eighteen planes of the line were in operation daily, carrying 5,474 passengers and flew 244,286 miles, compared with 5,164 passengers and 243,443 miles in April. In the final week of May, the line carried 1,431 passengers compared with 1,249 passengers the previous week.

Each month in 1930 has seen a substantial increase in traffic over the T.A.T.-Maddux system, which operates in seven States and in coöperation with two railroads. In the first five months of this year, 19,307 passengers have used the line and planes of the company flew 971,242 miles.

Slightly more than half the travel in May was over the eastern section of the system, between the Atlantic Seaboard and the Middle West, as well as between Middle Western cities. The balance of the travel was over the California divisions between San Francisco and Agua Caliente, Mexico, and over the western division, between Clovis, New Mexico, and Los Angeles.

In California a large majority of the travelers moved between Los Angeles and San Francisco, an indication of the line's appeal to the commercial travelers of the section.

Colonial Adds Another Scheduled Run

PASSENGER schedules of the Colonial Air Transport, Inc., line between New York and Boston have been revised to include a fourth trip daily in each direction; the policy having gone into effect the first week in June, according to B. A. Pollet, general traffic manager.

Planes now leave the Newark Airport for Boston at 9:00 a.m. and 12:30, 3:00 and 5:30 p.m. Southbound planes leave Boston Airport at 8:00 and 10:30 a.m. and 1:00 and 4:30 p.m. The same bus service that was available for the former three round trips will be extended to include all trips on the new schedule.

The new schedule offers the New York passenger a choice of the 3:00 or 5:30 o'clock planes. The earlier trip enables the summer vacationist to reach the numerous summer colonies around Boston in time for dinner.

The same Fords will be used on the line that have carried its passengers since the line's inauguration. Two Sikorsky S-38 amphibions and a pair of Fairchild 71's will be available for extra sections and for special trips. Flying time remains one hour and forty five minutes northbound and two hours southbound.

Flying Boat Delivered in NYRBA

THE first of the new thirty-passenger Consolidated Commodores, the largest flying boat to be placed in service on a regular airline in the world, was recently launched in the company's seaplane basin at Buffalo, N. Y. It was flight-tested and made a special demonstration flight before officials of the airline took delivery.

The new plane is a development of the present twenty-two-passenger Commodores now in use by NYRBA Line, and was built to compete in the race for foreign trade and South American good-will now being waged by German, French and American airlines in South America. It differs from the present model in that passengers enter it from the front; a sort of salon de luxe seating six is in the forward end, with three regular eight-passenger compartments behind it. The radio room and toilets are located in the rear.

The ship is equipped with twin Pratt and Whitney Hornet engines and is capable of a high speed of 138 miles per hour.

REGULATING AIR TRAVEL

Ownership of the Air

THE recent decision of the Supreme Court of Massachusetts in the case of Smith vs N. E. Aircraft Co., found in 170 Northeastern Reporter, 385, perhaps does more to establish the right of an airplane to fly over a person's land than any other court decision to date, because it is the first time the question has reached such a high tribunal. The right to fly over privately-owned land was upheld by the court, with reservations. The circumstances of the case were as follows:

The plaintiff, Smith, owned an estate of 270 acres known as "Lordvale" located in Grafton, Mass., outside Worcester. When the Worcester Airport was established, ninety-two acres of land adjoining this estate were purchased, rolled, graded and surfaced, structures were erected and in all the sum of $100,000 was spent there in improving the property.

Then the Worcester Airport leased the whole thing to the North-East Aircraft Company, which presently began flying operations there. The planes, of course, flew over the plaintiff's land all day long and annoyed him to the point where he brought suit to enjoin the planes from flying over his land. He appealed and appealed and finally reached the State Supreme Court.

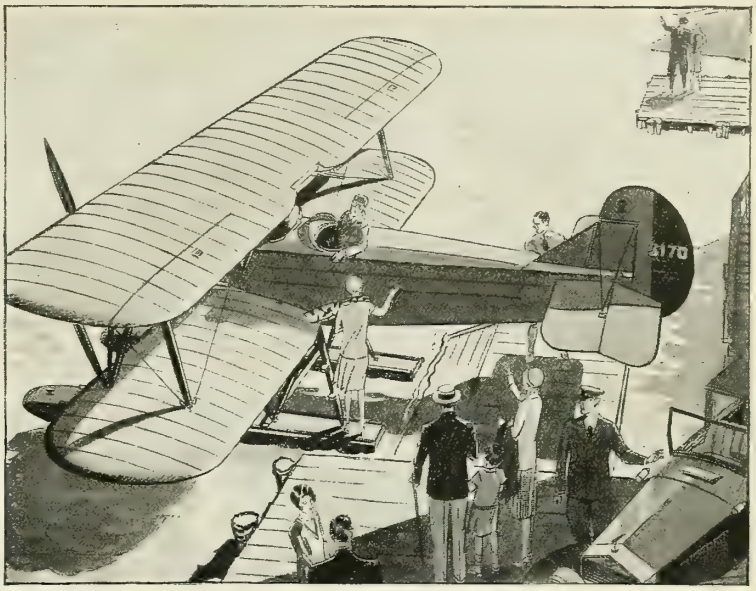
The record of the case shows that the plaintiff, Smith, first informed the airport that the noise must stop. This was in May, 1928. Since that time the planes have avoided this land as much as possible, but not enough to satisfy the owner of the estate. The Chief Justice, Mr. Ruggs, handed down a decision somewhat as follows:

"We think that no constitutional right of the plaintiff has been infringed . . . the act of Congress and the statutes of this Commonwealth by plain implication, if not by express terms, not only recongize the existence of air navigation but authorize the flying of aircraft over privately-owned land. The public nature of certain landing places is recognized by statute." Also that the rights of the landowner are limited in the airspace above his property; that he can build a building on it as high as he chooses in the absence of controlling regulation, but that private ownership extends only to "a reasonable height."

This is a stinging rebuke to the property-owner, because the decision refutes every one of his contentions, censures the lower courts for having admitted some of his arguments in evidence, and in general extends a benovelent hand over the art of aeronautics.

It must be remembered, however, that by referring to a "reasonable height," the Supreme Court was not indulging in idle comparisons. There is a "reasonable height" below which airplanes should not intrude. The Department of Commerce has specified these altitudes for all sorts of conditions, and if this property-owner could have proved that the airplanes had been flying below the legal limit, he could have stopped the future

(*Continued on next page*)



PARTNERS TO PLEASURE AND PROFITS

EDO FLOATS

BUSINESS center and far frontier, city home and wilderness cabin, yacht club and the sporting spas of a hundred shores are linked by flight and EDO Floats for owners of ships that cruise the water and cleave the air. Profit, too, becomes a partner to pleasure, for with EDO Floats, transport operators are finding virgin fields in sightseeing, charter and regular airline service. For passengers enjoy not only the scenic pleasures of over water flight but also the assurance of an endless airdrome beneath!

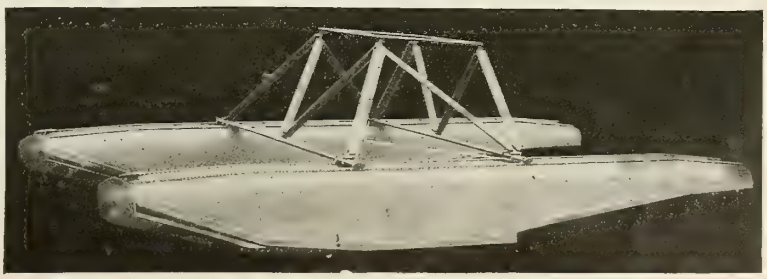
Sturdy! EDO all-metal floats have heavy outer shells, keels and bulkheads riveted into one complete unit capable of standing the severest strains. Permanent! Exclusive construction of anodically treated, non-corrosive "Alclad" insures long life. They will not swell, shrink, or absorb water. Maneuverable! The patented fluted bottoms assure a quick, clean take-off. The shallow sterns are repeatedly praised by pilots for quick turning and maneuvering on the water.

EDO Floats are built in 11 standard sizes for planes up to 8250 lbs. gross weight, and are standard equipment with all leading aircraft manufacturers. They have been licensed in the United States or Canada for 29 distinct types of planes—more than all other makes of floats combined. All of these sizes are stocked for prompt shipment. All are complete installations quickly interchangeable with wheel landing gear.

The services of specialists of long experience are immediately yours in recommending the proper size of float for your plane. For complete information, address: EDO Aircraft Corporation, 610 Second Street, College Point, Long Island, N. Y.

FEATURES TO REMEMBER ABOUT EDO FLOATS

All metal construction.
Anodically treated against corrosion.
Will not swell, shrink or absorb water.
Water-tight bulkheads every 2 feet.
Patented fluted bottom for quick takeoff.
Heavy keels, shallow sterns for beaching.
Flat decks for ease of taking on loads.
Wide sterns for perfect taxying.
Interchangeable with wheel landing gear.
Easy to install and overhaul.



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operations of the airplane company by injunction.

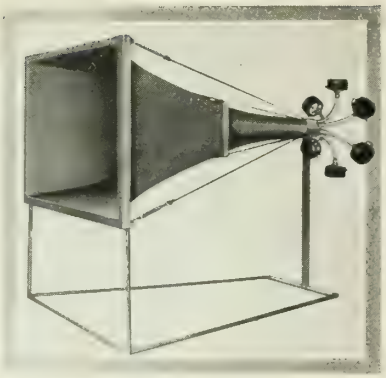
Another interesting point is that the presiding justice explained the decision by saying, "This case does not contain elements of flights made with intent to annoy. The noise of planes flying over the plaintiff's land does not interfere with physical comfort." In other words, if the planes had been flying low over the man's house to annoy him, it would have been a different story.

It might be well to note this case for future reference. It marks the highest decision yet made defending the airplane's right to fly over privately-owned land, and will be quoted often in the future.

NEW DEVICES AND METHODS

A New Super-Power Horn for Airports

WHAT is claimed to be the most powerful speaker yet produced has lately been offered by the Macy Manufacturing Co., of Brooklyn, N. Y. It has six independent, heavy-duty receiving units instead of a single dynamic unit as in the ordinary reproducer, and although the air column is the same length as an ordinary horn, the pressure is six times as great. It can be mounted on a swivel and turntable and can be raised and lowered at will. Makers claim that it is audible for five miles in any direction.



Macy super-power horn for airports

Amplion Horn at Roosevelt Field

ROOSEVELT Field, L. I., has a special installation of two large Amplion high-power reproducing horns, by means of which the large numbers of visiting sightseers are informed as to the identity of pilots and movement of planes at the famous airport. Located at one corner of the landing area, one twelve-foot horn points down one side of the field while the second horn is aimed down the other. By means of a microphone, pilots and announcers describe the type of planes taking off and explain what they are doing.

An Ireland amphibion at Roosevelt Field has been equipped with a short-wave radio transmitter, and with an operator inside its small cabin, it can hover over the field and allow the radio man to talk to the crowd below through the Amplion equipment.

THE MUNICIPAL AIRPORT of LOS ANGELES

Woodruff De Silva
Assistant Director
Los Angeles Airport

BECAUSE of the great amount of aeronautical activity in Southern California, the aviation industry of Los Angeles has long advocated the purchase and establishment of a municipal airport. Los Angeles now has an airport on the site of the National Air Races of 1928. The field in its natural state accommodated several hundred planes, and immediately following the races the City of Los Angeles took steps to provide for adequate airport facilities and flying control.

The Department of Airports functions directly under the City Council. The organization consists of a director, Colonel Richard B. Barnitz; an assistant director, and a superintendent with the necessary field staff of attendants and maintenance crew. The office administration is directly under an executive clerk, who has the necessary staff of clerks, stenographers, etc.

This department not only is building and developing a municipal airport, but also regulates all flying in the city, and has as well the authority to issue certain permits, etc. In addition, in an unofficial way, aviation companies locating at the airport advise with the department as to building regulations, enforcement, zoning, and many other phases of this form of transportation.

The Los Angeles Airport is thirteen miles by automobile from the City Hall, or thirty minutes driving time. There are many highways to Hollywood, Beverly Hills, Los Angeles business section and to other districts. For the convenience of shippers, the Santa Fe railroad has at the port a siding called "Lairport." Bus and trolley services make direct connections to the downtown district.

The atmospheric conditions are good. There is a prevailing westerly wind about eighty-five per cent of the time. Since the field is close to the coast, the wind is constant, not gusty but steady, and rarely exceeds ten miles per hour.

A paved take-off strip, 100 by 2,100 feet, has been completed, as well as a considerable area oiled and prepared for landing. Two main drains of porous pipe have been installed in the landing and take-off areas. Additional drainage facilities are to be constructed this spring in the south building area to take care of the run-off of all hangars, roads, etc.

The entire 640 acres is bounded by a seven-foot wire fence. Forty feet inside the established building line, there is an inner woven wire fence, with removable sections at each taxyway. This makes for more effective control of crowds visiting the port, and yet provides sufficient area for the public to observe operations.

The established building line runs east and west on the south side of the field; only the administration tower and building extend beyond, for the purposes of control. Other than Municipal Hangar Unit No. 1, all structures, including the restaurant, fire station and hospital, will have doors on either end opening east and west on to 100 to 150-foot taxyways or streets. This arrangement makes it possible to construct a line of hangars and does not confine the construction to one line of hangars bordering the landing strip. (See the accompanying diagram of the Los Angeles Airport.) The north section is for proposed future development.

A complete night lighting installation has

(*Continued on next page*)



Building line at Los Angeles airport showing aircraft based at the field lined up in front of hangars

APPROVED

BY EVERY MOTOR MANUFACTURER



with an APPROVED TYPE CERTIFICATE

(in production as of Sept. 1, 1929)

HERE IS indisputable proof of Richlube quality...this sweeping tribute by the Nation's great motor manufacturers. A tribute unattained by any other motor oil!

And there is further proof... Richlube's remarkable performance in record-breaking flights: It was used by Tex Rankin for the new 19-outside loop record; by Elinor Smith in setting the new women's altitude record; by Pat Fleming, in the new 100-kilometer Payload speed record; and by young Frank Goldsborough in the new Junior Transcontinental record. Richlube is endorsed by Anthony Fokker, dean of airplane builders, and is used by leading air transport lines including West Coast Air Transport, Mid-Continent Air Express and T.A.T.-Maddux (West Coast Division).

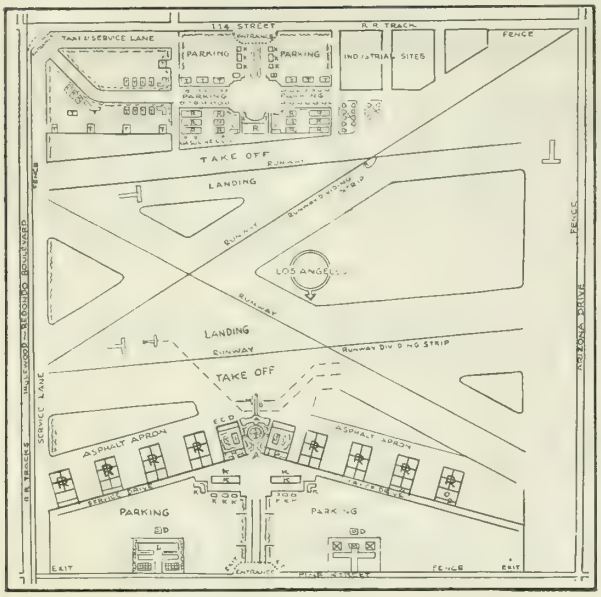
The government, too, places its stamp of approval on Richlube...it is on the approved list of the U.S. Navy...and meets the exacting specification requirements of the Army.

RICHLUBE

100% PURE PENNSYLVANIA MOTOR OIL

The next time you fill ...*say Richlube!* You can get it at airports everywhere.

RICHFIELD OIL COMPANY—LOS ANGELES—NEW YORK CITY



Map showing how the Los Angeles airport will look when completed



Southwest Photo Service

View of the Los Angeles Airport. (Right) Woodruff DeSilvia, Assistant Director, and R. B. Barnitz, Director

(*Continued from preceding page*)

been made. This equipment includes the regulation obstruction lights on all poles adjacent to the port; eighty-four landing area boundary lights in series, with single series transformer and single circuit bordering the entire area; safety coils installed in the base of each unit to prevent accident from high voltage. A film cutout is used to prevent radio interference by short-circuiting the secondary of the safety coil in case of lamp failure.

The landing area floodlights are of the Crouse-Hinds incandescent type, because it was thought the yellow quality of light from an incandescent type has more power to penetrate fog and dust than the blue and violet of the arc, and because the incandescent light requires less attention than arcs. A bank of seven floodlights was used because it is flexible, since each light may be individually adjusted. These lights are remotely controlled. They are also equipped with lamp setters in order to adjust the lamps at the focal point in the day time. Three-hundred-watt globes are used.

All structures are floodlighted to the required intensity by Crouse-Hinds vapor-proof type equipment, with heat resisting lenses and reflectors. For the sides and front of the hangar a special angle sign reflector is mounted. It is neat in appearance and does away with the old type factory goose-neck reflectors.

A Crouse-Hinds ceiling projector, with alidade graduations for direct reading, has been installed.

A coded beacon of the B. B. T. flasher type surmounts the administration building; this light has two 3,000-watt incandescent lamps and ground fresnel lenses. This 83,250-candlepower beacon is automatically controlled. A mercury type of flasher was used to prevent radio interference. This type of beacon was used because of its great period of luminosity, its distinctive characteristic (coded flashing letters "L. A.") and its visibility to all points of the zenith.

Directly underneath the beacon are ten-millimeter Neon tubes eight feet long on each corner of the octagon. To increase the efficiency, a metal reflector in the shape of a trough is placed behind the tubing. On the roof of Municipal Hangar Unit No. 1 is the insignia "L. A." in ten-foot Neon letters. There is also a forty-foot Neon meridian marker on the roof.

In addition, all light, power and telephone lines are underground. The installation is all complete for some twenty major structures. All gas and water lines are installed for the area.

All gasoline, air and water for the servicing of planes is by the pit system at established points inside the inner fence line, near the dead line of parking.

Up to the time this is written, the department has made the following expenditures on permanent improvements:

Lighting	$ 34,689.57
Gas	2,656.50
Water	13,122.33
Drainage	22,000.00
Hangar	60,980.75
Restaurant and comfort stations	16,445.08
Roadways, runways and taxyways	29,095.12
Fence	8,502.54
	$187,491 89

The item of hangar includes Municipal Hangar Unit No. 1, consisting of two hangars, 100 by 100 feet, with shops 19 by 60 feet adjacent thereto; a 100-by-30-foot foyer between these two hangars, which is the highway approach to the administrative tower, 30 by 30, and four stories high, surmounted by an observation tower.

On the first floor is a general office, pilots registry, switchboard, pay telephones, a waiting room, storage room, toilets, showers and locker rooms. Space along the foyer is for offices of tenants.

On the second floor is a local office for the Department of Commerce, where an inspector is on duty every day to give examinations to pilots, inspect planes, etc. There is an additional office on this floor not in use. There are private washrooms and toilets for the office staff.

On the third and fourth floors are the administrative offices of the department. The director and the assistant have a clear view of operations and are removed from the general noise of the port.

Directly east of this group is the restaurant building erected by the city and leased to the Interstate company on a percentage basis. Here counter space, private dining rooms and a main dining room are provided.

The Curtiss-Wright Flying Service has leased five acres for one of its primary and secondary school units and has erected the first of six major structures; a beautiful hanger with students' lounge, classroom, offices, etc.

The city has several minor structures erected, including rest rooms, four individual hangars, garage for the department equipment, etc.

The department plans to build two major hangars, one 120 by 160 feet and another 140 by 200 feet. The first is for the California Aerial Transport Company, which operates an approved school and charter business. The other is to be taken over by an accessory and service company of nation-wide reputation.

The Curtiss-Wright Flying Service expects to construct an additional hangar shortly. The Hercules Airplane Products Company is to soon erect its own hangar, 100 by 120 feet. This firm is the California distributor of the Bellanca monoplane, and California, Arizona and New Mexico distributor of the Barling NB-3. Hercules also

(*Continued on page 102, center column*)



Ground for the air. The major parts of the airplane motor ... the closely fitting parts of all fast working engines ... are ground to mechanical perfection. Speed translated into mechanics means accuracy. Accuracy in modern production means grinding.

Norton Company, Worcester, Massachusetts

GRINDING WHEELS, GRINDING and LAPPING MACHINES, ABRASIVES FOR POLISHING,

NORTON

PULPSTONES, REFRACTORIES, POROUS PLATES, FLOOR and STAIR TILES, ABRASIVE AGGREGATE.

TRENDS in HANGAR CONSTRUCTION

Milton T. Clark
Vice-President,
Truscon Steel Company

THE hangar bears the same relationship to the airport as do wharves and docks to the seaport and as do great railroad terminals to that mode of transportation. But hangars differ in that they represent a more intense center of activity and a greater physical proportion to the whole.

The automotive industry involved tremendous expenditures for its development. A new system of roads was necessary. The crowded condition in our streets and highways that has resulted from millions of motor cars has been one of the important factors in turning man's attention seriously to the air. Nature has provided air lanes vaster than the waterways and immeasurably greater than the ultimate development of the highways and railroads.

Municipalities have realized the importance of airports and to some extent their responsibility in providing adequate ground facilities. More than 1,100 airports have already been established in this country, with some 1,400 more projected, a total of approximately 2,500. Some cities have half a dozen airports, and even small villages are alive to the necessity. Private capital and industry have done the greater part.

Manufacturers heretofore were concerned primarily in three or four major requirements in choosing locations for plants: nearness to the principal markets, sources of raw material, labor supply, and railroads and good highways. But under present conditions the manufacturer who does not give consideration to the convenience of air transportation for his salesmen and representatives, his mail and, in some lines, actual deliveries, may find himself greatly handicapped, perhaps even confronted with the necessity of soon making a change at a loss.

Considered as an integral part of the complete facilities at the airport (including repair shops, parts department, school, weather bureau, telephone, telegraph and wireless headquarters, living quarters, showroom, etc.), the hangar is perhaps the most imposing physical element in this great system. It represents the largest single unit of capital expenditure or investment. It is the most impressive to the customer and the public. It is an expression of permanence, responsibility and confidence. It has a tremendous psychological influence.

Last summer, I made an air trip from Kansas City to Los Angeles. I left my hotel at 8 o'clock in the morning. I was in the air at 8:30 and arrived in Los Angeles at 9 o'clock the same night in a good ship, on a well managed line, completely comfortable. At Kansas City I found two splendid airports. Many large, handsome well-equipped hangars. A good waiting room with telegraph and telephone service. A uniformed and business-like organization. Fine ships. No confusion. An ordinary procedure. Permanence. Stability. Confidence. And the same was true at the other end.

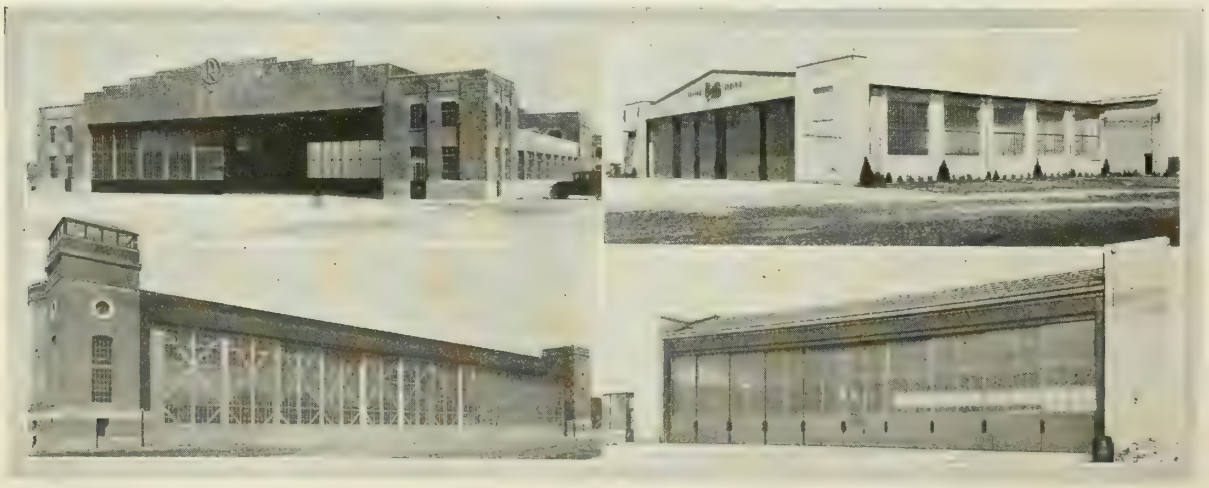
With fares reduced on most of the airlines, the cost to the passengers is not now as important as convenience and confidence, and this article deals with confidence and convenience as expressed by buildings and their representation of capital expenditure, determination and the business man's conclusion that air travel is now an economic factor in our every day experience.

Airport buildings should be of good architecture. The human being is, to a very large extent, unconsciously influenced by his surroundings. We know what things we like or dislike. We feel a pleasing or displeasing atmosphere, most frequently without knowing why or stopping to analyze. We revel in untrammeled nature—whether it be expressed in bare mountains, a painted desert, a wooded glen, an open field or a great forest—because nature is a good architect, and good architecture follows the example of nature.

A pile of brick and mortar, or stone and steel, can be rendered pleasing under the hand of the skilled designer and without any serious difference in cost. Good architecture is based on a few simple fundamentals. A building must be well constructed. It must have the appearance of appropriateness for the service it is to perform. And it must have good proportion, pleasing color and texture, well balanced mass and design. All of these things can be incorporated in airport building by the proper selection of an able individual to plan them. To attempt to save money by the elimination of the architect's fee is, in the long run, to create waste. Everyone cannot create beautiful things; yet competent men in the profession are available on every hand. The physical results of their efforts and labors are present as a guide for selection. The architect cannot be an expert in every line, but if he is capable he knows how to marshall the experts in the various elements involved and how to produce a pleasing and satisfactory result.

Expediency is an important factor in the preliminary stages of any development; the start must, of necessity, be more or less temporary. Compare the modern school building with the old red schoolhouse. Look at the great railroad terminal structures in our big cities—cathedrals of beauty, confidence and convenience. At the end of power transmission lines, in most cases, is a beautiful powerhouse. Why is it not practical to hope that the same thing can prevail in the airport development? In air travel no tremendously expensive railroad tracks and road beds or costly highways or transmission lines are necessary. The whole opportunity of doing a good job in this field of transportation is simple, it is concentrated at the airport. The necessary expenditure is, therefore, comparatively small,

(*Continued on next page*)



Representative modern hangars: Upper left, one of eight new hangars at Roosevelt Field, L. I.; right, Curtiss-Wright Flying Service headquarters at Bowman Field, Louisville, Ky.; lower left, Wright Field Assembly Building; right, Ford hangar at Lansing, Ill.

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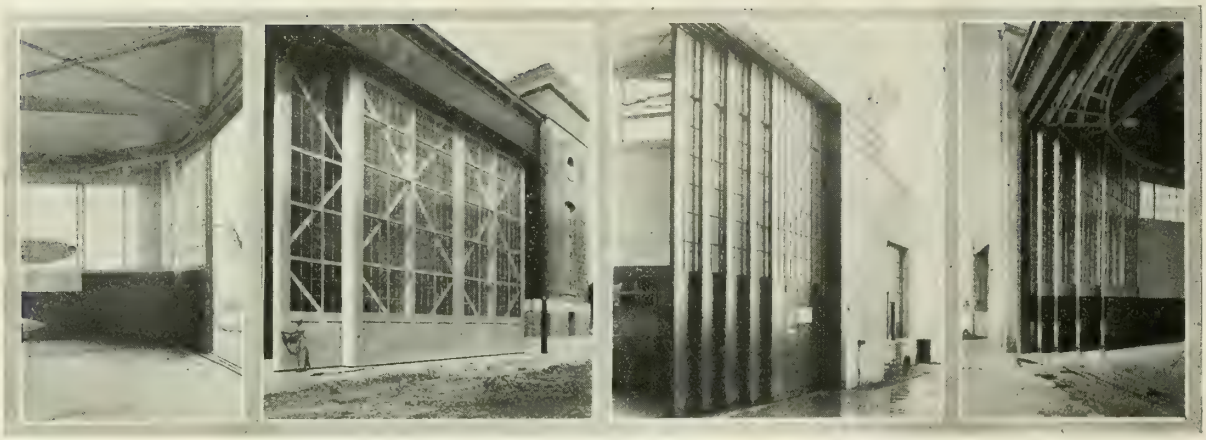
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Address_____

City_____ State_____

AIRTECH

LINDBERGH FIELD SAN DIEGO



Various types of Truscon steel hangar doors as installed in up-to-date airport buildings

(*Continued from preceding page*)

and as I have said before, its importance and influence is vastly greater than most other fields.

In actual construction, the building should be fire-proof because of the very nature of its occupancy. It should be constructed of steel and masonry with fire-resisting windows, doors and roof. It is not unusual to find that the combined value of planes and equipment housed in a hangar exceeds the total cost of the structure. Is it not, therefore, good judgment to construct the building to afford the maximum protection and convenience? Fire losses can be covered by insurance, the cost of which depends upon the fire-resisting properties of the building. But the greatest urge for better buildings today comes from the insurance companies themselves, because they know it is good business to minimize fire losses. Insurance cannot possibly compensate for the destruction of business, the loss of earning power, the time required for replacement, and the interruption in service.

It would be unfortunate to construct a poorly designed building of permanent materials; consequently, our interest and our judgment must be balanced. It would be a greater misfortune to construct a beautiful building of temporary materials, because beauty is a joy forever and a thing to be preserved, and its influence on the public's mind and the people that come in contact with it is immeasurably for the good.

LOS ANGELES AIRPORT

(*Continued from page* 98)

does a general repair business and operates a school.

The airport has been in operation only a short time and the revenues do not compare favorably with the expenditures at present; indications are, however, that the operating expenses will soon be taken care of by the revenues received.

Following is a schedule of charges in effect at the present time:

HANGAR SPACE

Wing Span	Day	Week	Month	Year
To 30 ft. incl.....	$1.10	$8.50	$30.00	$320.00
30 to 35 ft. incl....	1.50	9.50	35.00	390.00
35 to 40 ft. incl....	1.75	10.50	39.00	445.00
40 to 45 ft. incl....	2.00	12.50	47.00	540.00
45 to 50 ft. incl....	2.25	14.50	53.00	610.00
50 to 60 ft. incl....	2.50	16.50	63.00	720.00
60 to 70 ft. incl....	3.50	22.00	80.00	825.00
70 to 85 ft. incl....	4.75	30.00	110.00	1,200.00
85 to 100 ft. incl....	6.26	40.00	150.00	1,600.00

Dead storage shall be forty per cent less than the monthly rate, with no dead storage under three (3) months. This infers no use, construction or work on such planes during the period of dead storage.

GROUND LEASES

Hangars, Schools, etc. (Ground Leases)

First three years.....	$.035	per square foot
Second three years.....	.05	per square foot
Balance	.06	per square foot

Industrial Sites (Ground Leases)

First three years.....	$.03	per square foot
Second three years.....	.04	per square foot
Balance	.06	per square foot

FIELD STORAGE AND USE

1. Per month, $15.00; per week, $4.50; per day, $.75.
2. $.75 square foot minimum charge per year for shop space.
3. $1.00 square foot minimum charge per year for office space.
4. $10.00 per month for passenger plane for commercial privileges.

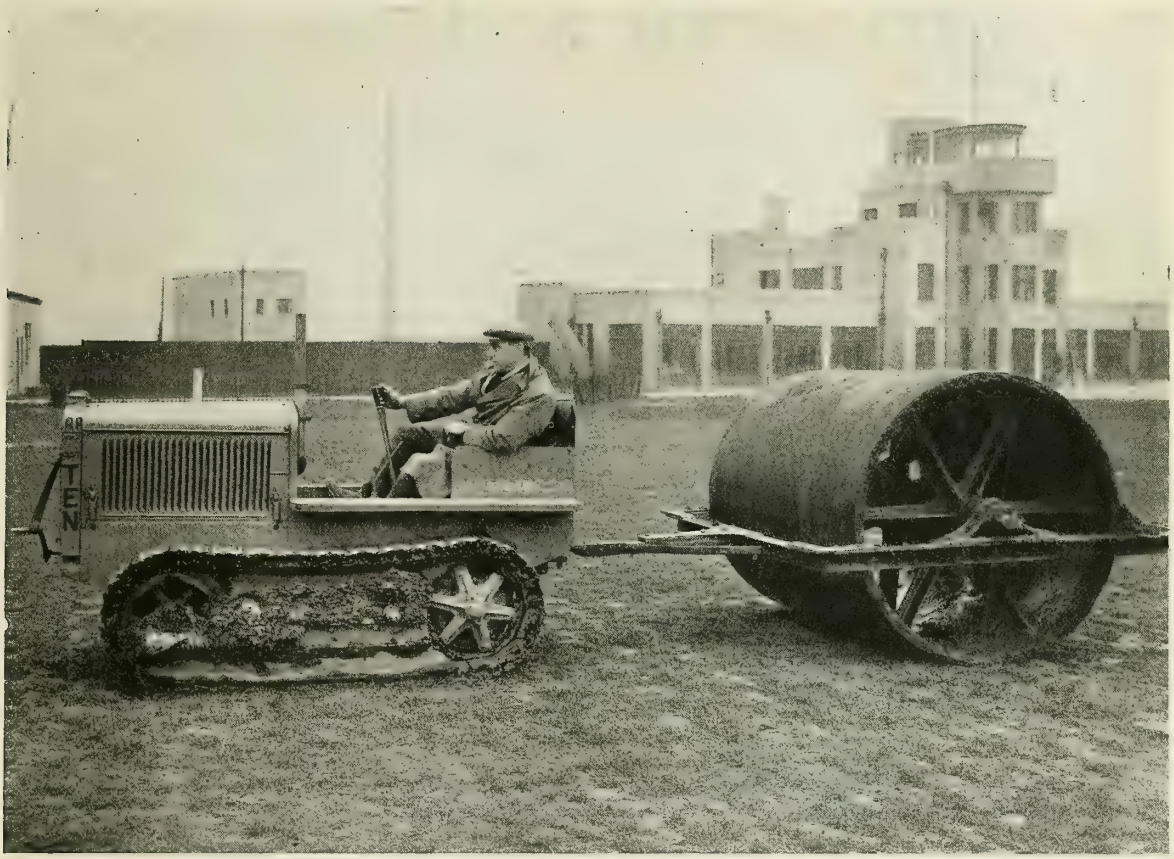
No weekly or daily allowed, except by special permission, and then twenty-five per cent of the gross receipts shall be taken by the Department of Airports in excess of the usual hangar charges.

1. Student pilots based at other airports, but using the municipal airport for practice landings and take-offs: $1.00 per day per plane; $5.00 per week per plane; $15.00 per month per plane.
2. Motion picture companies using portion of municipal airport for filming of pictures: Minimum charge of $25.00 per day of operation, and any additional charge shall be at the discretion of the Director of Airports.
3. Lighting field floodlights: $1.50 per hour or fraction thereof; $.25 per hour or fraction thereof for hangar lights.
4. Locker rental: $.50 per month.

In addition to the above items, income from pay telephone, gasoline, oil, gas, water, restaurant concession and miscellaneous sources are received.



San Diego Naval aircraft storehouse with Truscon steel deck roof and steel windows



FAIRWAYS and AIRWAYS

SMOOTH as a putting green—the new field at the Heston Aerodrome, England. Leveled, drained and rolled with "Caterpillar" power! The picture shows a heavy roller being pulled by a "Caterpillar" Ten Tractor—just the machine for airport maintenance—power and traction for any use in any weather—towing the biggest planes, clearing snow, rolling turf, digging drains. Ask for the "Caterpillar" book.

Caterpillar Tractor Co.

PEORIA, ILL. *and* SAN LEANDRO, CALIF., U. S. A.
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Prices—f. o. b. Peoria, Illinois

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THE AIR SERVICES

MORE ABOUT THE RESERVES

By C. B. Allen

THERE have been a number of developments affecting the welfare of the Air Corps Reserves in the New York area since publication, in the October issue of Aero Digest, of an article entitled "The Embattled Air Reserves." At the present time, this branch of the service in the metropolitan district gives more promise than ever before in its history of forming a permanent and determined organization of active fliers who will function together in definite units with an identity and *esprit de corps* of their own; not in the haphazard manner that in the past has been the Reserve's chief weakness.

Two Air Corp Reserve squadrons, composed entirely of pilots with a "Class One" rating (men qualified to fly "service type" planes without further training and to function in tactical maneuvers as the pilots of such planes), have been formed in the Second Corps Area and expect to be ordered to Mitchel Field, L. I., for their usual two weeks' active duty during next summer. Great interest has been aroused among the fliers involved, with a consequent improvement in morale. The chances now seem unusually bright of building up in New York an active Air Corps Reserve that will be at least as well knit together and valuable for national defense purposes as similar units organized in other parts of the country. The latter organizations, particularly those in Detroit, California, Texas and Kansas, have more or less been taken as models. Information concerning their activities and achievements has been obtained by correspondence, and from men who formerly belonged to these units; and an enthusiastic effort is being made to give New York something as good or better.

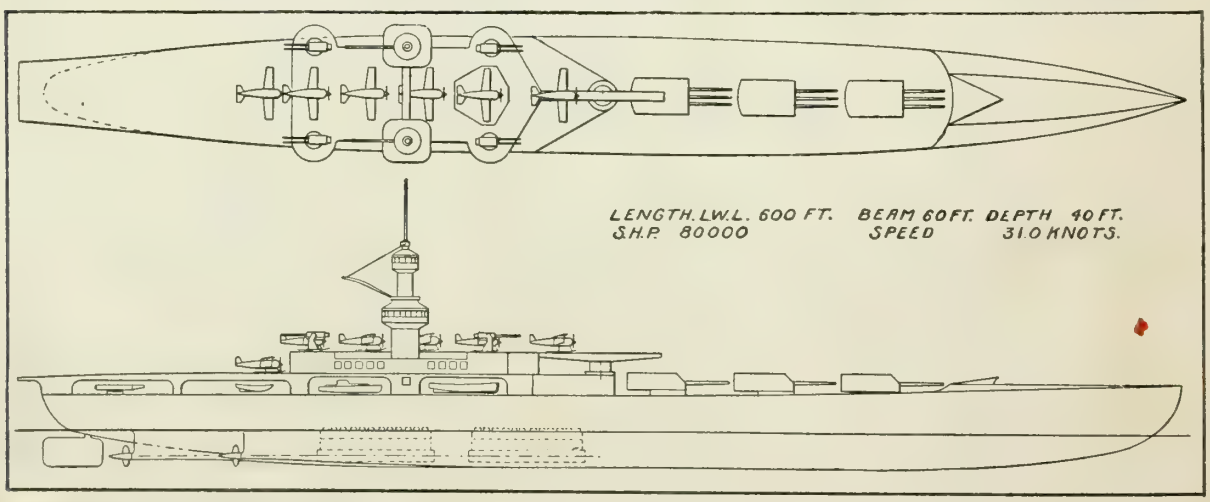
It is the ultimate aim of the New York Reserve squadrons to obtain their own equipment directly from the War Department, just as several of the Western units have done, so that their activities need not conflict with the required training schedules of the Regular Army fliers operating from Mitchel Field. This, of course, they expect to accomplish only in time—when they have shown that they are serious and dependable outfits that the Government cannot afford to ignore.

The Reserves have been greatly encouraged recently, as has the regular personnel at Mitchel Field, by War Department orders assigning twenty-one new service type airplanes—in this case O-1-E's, which are the latest and most improved version of the Curtiss observation plane—to the Army's flying field on Long Island. Several of these ships have arrived already and are in use; the entire complement is due to be delivered from the Buffalo factory during March. Their arrival greatly relieves an acute shortage of equipment that prevailed throughout 1929 and reached its lowest ebb late in the year when there were but six or eight service type planes on the post to care for seventy Regular Army pilots depending upon them for enough time in the air to draw their flying pay. So severe was this situation at its worst that the seven "training type" planes allotted to the field for Reserve training were pressed into emergency service by the regulars. Because of the great amount of "outside" work that Mitchel Field is called upon to do in addition to the missions arising in the Second Corps Area—it takes care of the First and Third Corps Areas, as well, in addition to various miscellaneous calls for Army planes in connection with the opening of commercial airports, special celebrations, etc.,—a serious effort has been made to keep nine of the more modern service type ships which the post had last year in order to brings its total complement up to thirty Falcons.

If this request is allowed, it will put Mitchel Field about on a par with other regular flying fields of the Army Air Corps, in spite of the additional work it is called on to do. At the same time, it will better the immediate cause of the Reserves by affording them a more frequent opportunity to fly service types when they report to Mitchel Field for practice hops on an inactive duty status. One feature of the order allotting entirely new flying equipment to Mitchel that is hailed with satisfaction by all concerned is that it marks the passing of the Liberty motor for all time, the new planes being equipped with up-to-date power plants, while the nine additional ships it is sought to keep also have the same sort of engines.

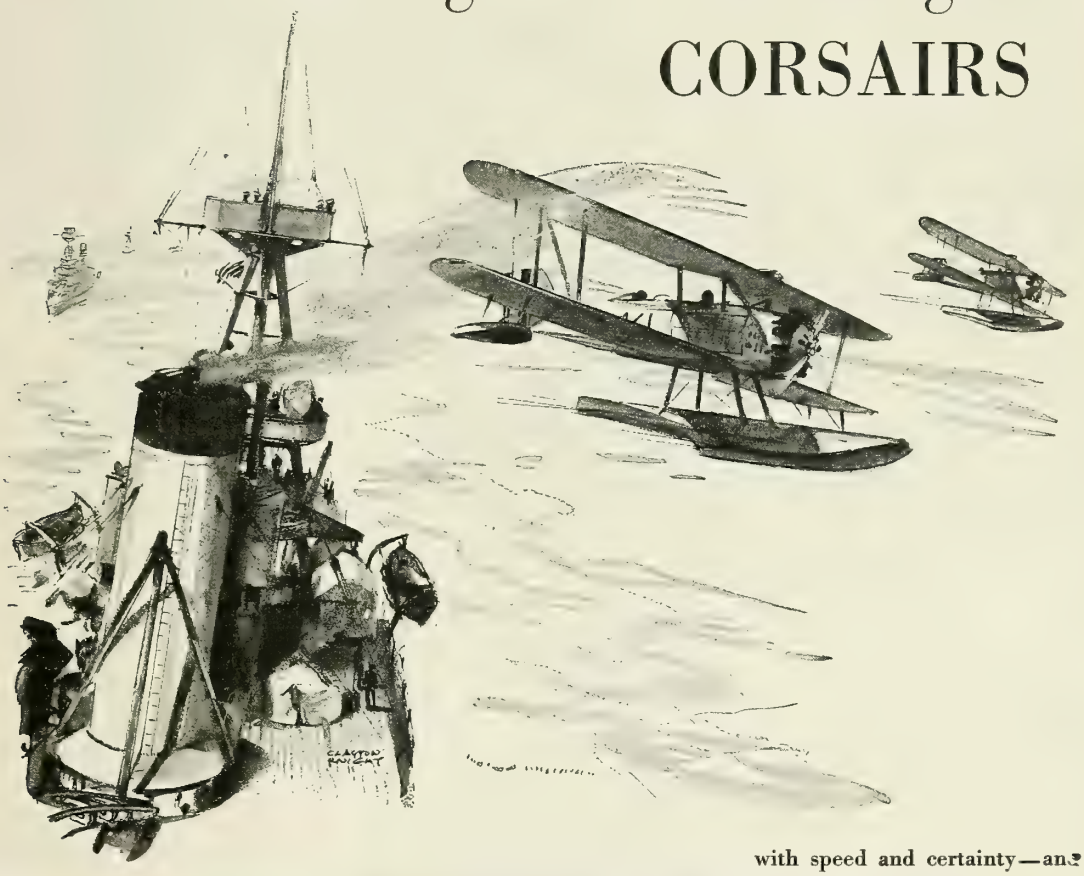
The investigation of conditions at Mitchel Field which was ordered by Major General Hanson E. Ely, commandant of the Second Corps Area, following publication of "The Embattled Air Reserves," disclosed the lamentable lack of equipment, plus an unusual amount of flying which the post was called upon to do in connection with the First division and the Corps Area Exercises held at Camp Dix during the summer, as the reason Reserves got little or no time in service type planes and were forced to do nearly all of their flying in slow training

(Continued on next page)



Line drawing of a 10,000-ton, Diesel-driven cruiser proposed under the terms of the Washington Treaty

Where the FLEET *goes . . . there also go* CORSAIRS



IT MAY be with a battleship. It may be on an aircraft carrier. But wherever the United States Fleets go there are sure to be *Corsairs.*

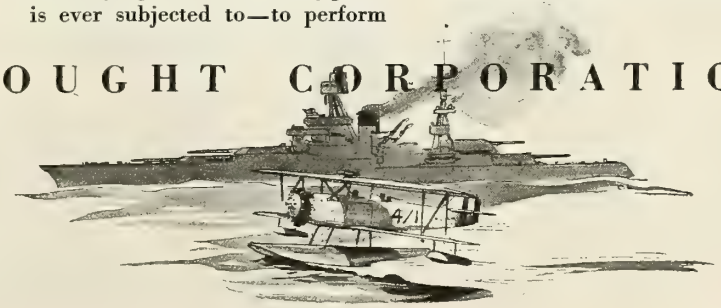
The *Corsair* above (No. A-7831) has already seen service with the U. S. S. California, flagship of the Pacific Fleet, the U. S. S. Idaho and land duty at San Diego.

A *Corsair*, like a sailor, never knows to what ship it will go or what duty will be asked of it. It must be prepared to stand up under the strain of catapult launchings from a battleship. To withstand the severe pounding of rough sea landings. To make quick take-offs from aircraft carrier decks. To give absolutely dependable service in emergencies of every kind.

That is why *Corsairs* have been built to perform under conditions more trying than the ordinary plane is ever subjected to—to perform with speed and certainty—and to *keep on* performing.

Corsairs today are carrying out some of the most difficult assignments which can be given to airplanes in naval air usage. Their successful record has made them the standard of observation planes in the U. S. naval air forces. CHANCE VOUGHT CORPORATION, East Hartford, Connecticut. Division of United Aircraft & Transport Corporation.

CHANCE VOUGHT CORPORATION



(*Continued from preceding page*)

type ships. The inspector found that "there is no evidence to establish the fact nor warrant the assumption that the War Department is endeavoring or contemplating the elimination of any Reserve officer who is capable of and willing to meet the necessary requirements. This assumption is created principally by a feeling among Reserve officers that the number of service type planes available at Mitchel Field is not sufficient to enable them to fly this type of plane often enough to establish and maintain their proficiency in its use." He further reported that the attitude of the Regular personnel towards Reserve Officers has been "on the whole, one of helpful co-operation."

As a result of the investigation and greatly to the relief of the Reserves, General Ely has ordered facilities made available whereby those intending to take two weeks active duty at Mitchel Field may apply in advance at the Army Building, 39 Whitehall Street, New York, and receive their typhoid inoculations and smallpox vaccinations. The discomfort and hazard of being required or allowed to go up and fly immediately after "these shots in the arm," with the attendant chance of fainting and crashing, which was risked at last summer's camps, thus will be obviated in the future. The fact that vaccinations and inoculations were not carried out at previous camps was found to be "due to an oversight on the part of authorities at Mitchel Field." General Ely also has taken steps to see that all Reserve officers get their required physical examinations when they fall due, either from the flight surgeon at Mitchel Field or by arrangement at the Army Building. This eliminates a very potent cause of discontent, for it was in the past almost impossible for Reserve officers to get appointments for the examinations required. In all fairness to the Medical officers concerned, it should be said, however, that excess of work of other sorts was responsible. Nevertheless, the old trouble of arranging to get a "64" (the service designation of the semi-annual physical examination) more than once gave rise to a grumbling suspicion that "the Regular Army doesn't want to be bothered with the Reserve," and the elimination of the difficulty will go far toward better relations and a more complete understanding beteen the two branches of the Army.

It is regrettable that certain Army officers construed "The Embattled Air Reserves" as a critical reflection upon Major William Ord Ryan, operations officer of Mitchel Field, who was acting commandant during last summer's training camps. Nothing of the sort could have been farther from the intentions of the author, especially inasmuch as Major Ryan, prior to assuming his present post, was liasion officer in the Second Corps Area between the Reserves and the Regular Army and was instrumental in bringing about many changes which bettered the lot of Reservists going down to Mitchel Field to fly. Both at that time and since being assigned to his present post, he has shown himself to be keenly interested in promoting the welfare of the Reserves whenever opportunity presented.

CURTISS MARINE TROPHY RACE

FLYING at a speed of 161.1 miles per hour, Capt. Arthur H. Page of the Marine Corps won the Curtiss Marine Trophy Race held at the Naval Air Station, Anacostia, D. C., May 31, the fastest time ever established in this event, and 11.1 miles faster than the nearest competitor. He flew a Curtiss Hawk seaplane powered with a water-cooled Curtiss D-12 engine, the only water-cooled engine in the event. The race consisted of five laps, around a twenty-mile course.

Originally a free-for-all open to all seaplanes and flying boats, the race was established in 1911 by Glenn H. Curtiss who presented the trophy to the Aero Club of America for annual competition. Since 1922 it has been a closed event, limited to standard Navy service types of aircraft. Five classes of service planes—training, torpedo and bombardment, amphibion, observation, and fighting—participated in this year's event, a total of twenty-four planes competing in the race. Three pilots were forced down and two were disqualified for cutting pylons. These planes competed for the Curtiss Trophy and for the Ingalls Trophy, presented by the Assistant Secretary of the Navy to the pilot of the plane showing in the race the highest ratio of speed to its rated speed. The use of N.A.C.A. cowling for the air-cooled engines, permitted last year, was barred this year by a stricter interpretation of the rules, which prohibit the use of any equipment that has not become service standard.

The Curtiss Hawk used by Capt. Page is the same one with which Major Lutz won the race two years ago, powered with a D-12. The ship was streamlined everywhere possible for use in the race this year. The speed of 161.1 miles per hour established by Capt. Page, is 2.1 mles per hour faster than that of the winner last year, using a plane powered with an air-cooled engine of similar power and equipped with the N.A.C.A. cowling. In addition, this time is over six miles per hour faster than the same Hawk with a D-12 that won in 1928. The winners of the Curtiss Marine Trophy Race are as follows:

Pilot	*Plane*	*Engine*	*Speed m.p.h.*
First—Capt. A. H. Page, USMC	Hawk	D-12	164.1
Second—Lt. A. P. Storrs, USN	Hawk	Wasp	153.0
Third—Lt. J. E. Dyer, USN	O2U	Wasp	145.8

In the Observation Class, Lt. J. E. Dyer, USN, flying an O2U powered with a Wasp engine, was first with a speed of 145.8 miles per hour; Lt. T. D. Guinn, USN, was first in the Amphibion Class, with a speed of 117.8 miles per hour, flying a Wasp-powered OL-8; in the Torpedo and Bombing Class, Lt. P. T. Stroop, USN, flying a T4M powered with a Hornet engine was first with a speed of 118.7 miles per hour; in the Training Class, Lt. D. W. Harrigan, USN, was first with a speed of 102.0 miles per hour, flying an NY powered with a Whirlwind.

Lieut. Harrigan, in the Whirlwind-powered NY, was winner of the Ingalls Trophy for the highest figure of merit, his speed of 102.0 miles per hour being ten miles in excess of the rated speed of ninety-two miles per hour for this class of plane.



Capt. Arthur H. Page and Glenn H. Curtiss

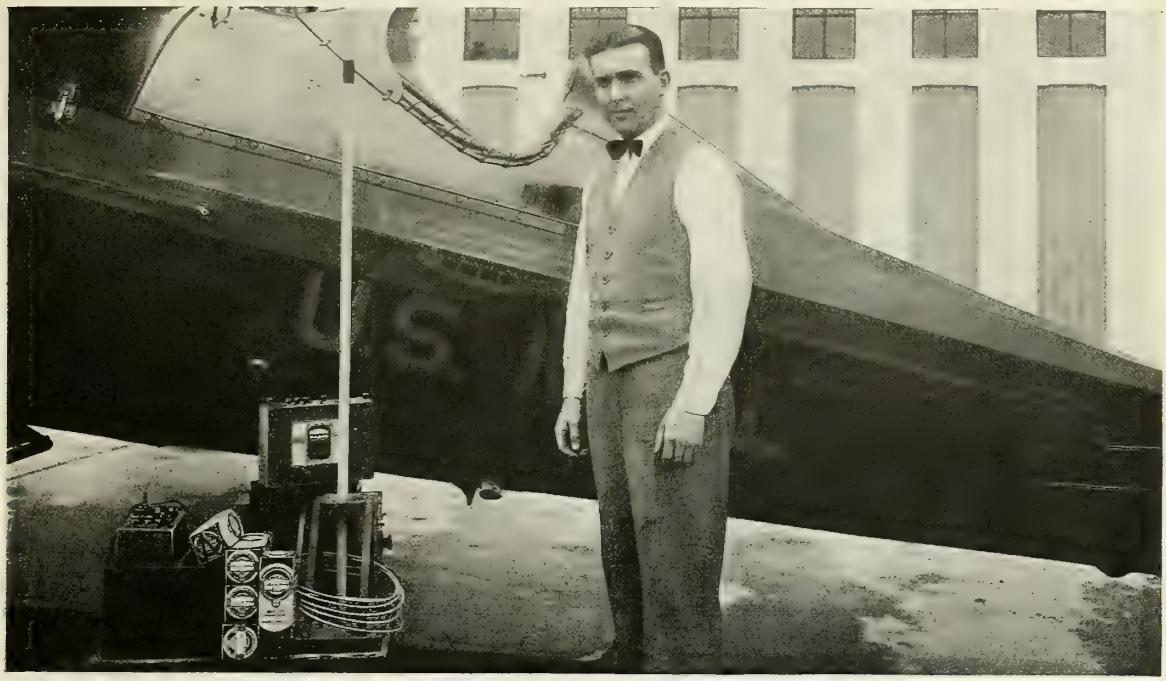
FUNDS FOR SCOTT FIELD APPROVED

AN appropriation of $1,206,500 for Scott Field, lighter-than-air station of the Army Air Corps, near St. Louis, Mo., was recently authorized by the Committee on Military Affairs of the House at Washington. The items include the following: hangars, $189,000; field shops, $122,000; depot shops, $200,000; field warehouse, $61,000; depot warehouse, $200,000; headquarters and operations building, $80,000; photo, radio and parachute buildings, $82,000; school building, $150,000; central heating plant, $50,000; gas and oil storage, $10,000; paint, oil and dope warehouse, $10,000; grading landing field and technical building area, $50,000; paved aprons, $51,000; gas plant machine shop and chemical storage building, $50,000; airplane machine gun butts, $1,500.

Lieutenant Matheny Receives Cheny Award from F. Trubee Davison

THE Cheney Award was presented to Second Lieut. William A. Matheny, Air Corps, May 26, at Bolling Field, Anacostia, D. C., by F. Trubee Davison, assistant secretary of war for aeronautics. Lieut. Matheny received the award for an act of valor performed at Manugua, Nicaragua, on August 30, 1929. This officer with First Lieut. Dwight J. Canfield and Sergeant Wright took off from Managua, Nicaragua, in a bombing plane. About seven miles from Managua the left engine caught fire, and a forced landing was made, the plane crashing in the jungle. Lieut. Matheny, uninjured in the crash, dragged Lieut. Canfield from the burning plane and succeeded in smothering the officer's burning clothing, in spite of severe burns. Lieut. Canfield's injuries proved fatal.

The Cheney Award is made annually by a board of Air Corps officers to a member of members of the Air Corps or the Reserve who perform outstanding acts of bravery.



Eveready-powered Stromberg-Carlson Receiver being installed in Eastern Air Transport plane at Boonton, New Jersey, under direction of A. W. Parkes, Aircraft Radio Corporation Field Engineer. E. A. T., carrying mail between New York and Miami, joins list of nationally known operators and sportsmen who've adopted A. R. C. radio-insurance.

SAFER FLYING ASSURED FOR ALL

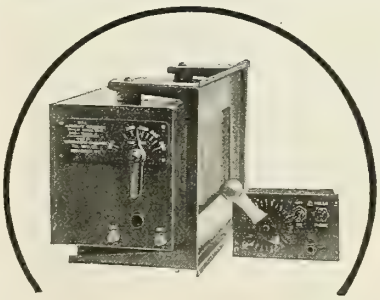
through pioneering achievements of Aircraft Radio Corporation Engineers

TODAY'S airplane is structurally safe — stable, maneuverable, dependably engined. But eyes and ears, hands and feet, skill and judgment still direct its flight.

Aircraft Radio Corporation started where aircraft builders, of necessity, stopped. It began scientific, systematic research into every phase of radio that might make flying safer — seeking "eyes" and "ears" a hundred times more sensitive, more trustworthy than man's, and instruments that would insure unfailing good judgment.

Research remains the Corporation's fundamental purpose. Cost has never entered into this work. A. R. C. engineers are concerned only with designing the finest radio-safety equipment that can be made at any price. Whenever such equipment is perfected, licenses for its production are issued to manufacturers of highest standing.

Aircraft Radio Corporation was first to develop radio beacon receiving equipment and shielding for standard spark plugs. This is still the only shielding commercially available which permits the transport operator to use the spark plugs best adapted to his own particular service. It has been adopted as standard for Pratt & Whitney engines. A. R. C. met the demands of a built-on antenna with a receiving set many times more sensitive than ever before, smaller in size, lighter in weight and with a range of 200 miles or more.



Aircraft Radio Corporation is the designer, sales representative and installation agent for all Aircraft Radio Equipment manufactured by Stromberg-Carlson Telephone Mfg. Co., and National Carbon Company, Inc.

Inquiries are invited. Better still, pay a flying visit—the A. R. C. airport is three miles north of Boonton, New Jersey.

This Receiver, manufactured under A. R. C. licenses by Stromberg-Carlson and powered by Eveready "B" Batteries and Eveready Raytheon 4-Pillar Tubes, is popular with army, navy and transport pilots and owners of private planes.

At Boonton, New Jersey, in their radio laboratories and instrument shops, in hangar and installation shop, on the flying field and in the flying laboratory, A. R. C. engineers are perfecting instruments which will further increase the safety and pleasure of flying. Let us send you a booklet and keep you posted on developments. Write

AIRCRAFT RADIO CORPORATION
SUBSIDIARY OF RADIO FREQUENCY LABORATORIES
BOONTON, NEW JERSEY

ARC

AIR CORPS DEDICATES RANDOLPH FIELD

[M. C. COOPER]

DEDICATORY ceremonies of Randolph Field, San Antonio, Texas, "The West Point of the Air," were held June 20-21, sponsored by the Air Corps, the San Antonio Chamber of Commerce, and the San Antonio Chapter of the National Aeronautic Association. Visitors representing Mexico, Cuba and other Latin American countries and the United States attended the celebration.

Following addresses on the morning of June 20, a formation of more than 250 aircraft, including 170 planes from Brooks and Kelly Fields, thirty-six from Fort Crockett, twelve from March Field, thirteen from Dodd Field, and eight from Fort Sill, passed in review over the field. A detachment of planes from Kelly Field, provided with special lighting equipment, flew over the city in the evening in conjunction with ceremonies, which included a banquet held on the roof garden of a hotel in San Antonio.

At the time of the dedication, work on the field had progressed to an interesting stage of development. An area of 450 acres, situated in the center of the field, where all the buildings will be located, had been laid out. Eighteen miles of roadway had been gravelled. All of the 1,800 acres of flying area surrounding the building area on four sides had been cleared and graded, and more than three-fourths of the territory sodded with Bermuda grass. A small portion of the flying area was marked for the convenience of planes bringing visitors to the field for the dedicatory ceremonies.

The warehouses of the Quartermaster Corps and the Air Corps have been completed, with work well under way on the enlisted men's barracks. Foundation work has been started on approximately 115 additional buildings. More than 4,000 workers have been employed in the development of the field. All public utility accommodations will be placed underground, including the telephone, electric lights, sewage, water, gas and fire alarm systems. At the time of the dedication installation of this work was under way. A nursery, valued at an approximate $5,000, has been established at the field, and marking for the location of trees, shrubs and various plants have been made. It has been estimated that between four and five million dollars had been spent on the development of the field previous to the dedication. The largest contract, up to that time, had involved one and one-quarter million dollars, and went to Murch Brothers Construction Company of St. Louis, Mo., for the erection of two warehouses and six barracks.

Three hundred carloads of steel weighing 5,000 tons had been delivered and construction of the first of eighteen hangars, each 110 feet by 240 feet, had been started. Although plans for the administration building, the hospital, school for children, gymnasium, and various other buildings have been completed, work on these buildings had not been started up to the time the field was dedicated. Officers' quarters comprised a large number of the 115 buildings then under construction.

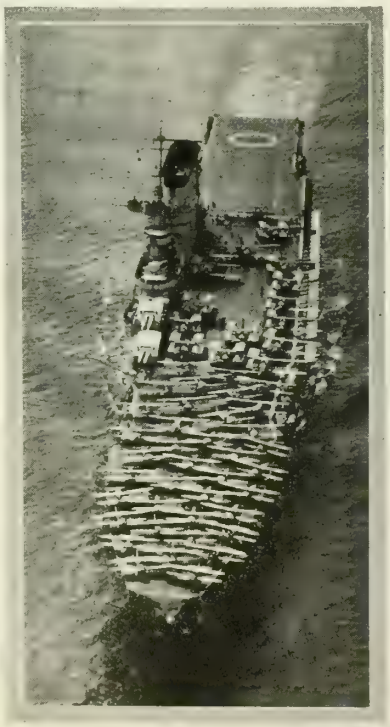
On the morning of June 20, the July graduating class at Kelly Field staged an aerial review, which included the dropping of machine guns and operating personnel by parachutes, balloon strafing, acrobatics, ground strafing, close formation flying, and parachute jumps. An aviation ball honoring the visiting notables concluded the celebration.

Randolph Field, when ready for use, will graduate 1,125 pilots annually. Occupying the position of the world's largest flying school, Randolph Field will have more than 400 planes and a personnel of 5,000, including officers, enlisted men and families, and students. It is the plan of the Government to combine the Primary Training Schools, now located at Brooks Field, San Antonio, and March Field, California. Students entering the Air Corps Training School will be instructed for eight months at Randolph Field. It has not yet been decided whether or not the Advanced Training School, located at Kelly Field, will be transferred to Randolph Field.

After two weeks of thorough examinations—mental physical and psychological tests, in which he is checked and re-checked—the new student will begin his flying study. Training on the ground and in the air start simultaneously. Ground school subjects include 100 hours of airplane and engine maintenance, sixty hours of radio buzzer practice, forty-eight hours of ground gunnery, twenty-four hours of aerial navigation, twenty hours each in maps, meteorology, and theory of flight, and four hours each in air commerce regulations, military customs, military hygiene, and personal equipment of the pilot. Forty hours of infantry drill will be required without grade. These courses will continue throughout the eight months at the Primary Training School.

Flight training for each student will be given in two divisions. In the first group approximately sixty hours of training on primary training planes will be given each student. At the end of four months' work the student will receive advanced instruction at Kelly Field if the Advanced Flying School is not transferred to Randolph Field.

In the advanced course, ninety-one hours' training on DeHavillands or 02-Ks is given. During the eight months of training each student will receive about 152 hour's flying time. Those who fail to qualify will be eliminated during the first eight months, elimination seldom taking place during the last four months of training as given at the Advanced School, Kelly Field.



(P&A Photo)

The Aircraft Carrier *Lexington*

AIR CORPS CADETS BEGIN TRAINING

A TOTAL of 236 civilian and enlisted candidates were recently selected by the Chief of the Air Corps for flight training at the Primary Flying Schools of the Army Air Corps, Brooks Field, San Antonio, Texas, and March Field, Riverside, Calif. They were to begin the course of instruction July 1; ninety-one civilian and twenty-three enlisted candidates at Brooks Field, and 112 civilian and ten enlisted candidates at March Field.

With the exception of two candidates who are non-commissioned officers in the Air Corps, all of the candidates will pursue the eight months' primary flying course under the status of Flying Cadet. The two non-commissioned officers will retain their grades.

The selection of these candidates for flight training was made in accordance with the policy of the Air Corps governing the appointment of qualified candidates as Flying Cadets. In making these appointments preference was given as follows: first, to thirty-one enlisted men of the Air Corps who have served at least six months; second, to two enlisted men of other branches of the Army with similar qualifications; third, to seventeen enlisted men and officers of the National Guard assigned to Air Corps units for at least six months; fourth, to ten college graduates of Air Corps R.O.T.C. units; fifth, to eighty-three college graduates who are graduates of R.O.T.C. units; sixth, to forty-seven officers and enlisted men of the National Guard who have had at least six months service; and, seventh, to forty-six graduates of recognized colleges and universities.

Col. Charles H. Danforth Recommended As Assistant to Chief of the Air Corps

UPON recommendation of the Secretary of War, the President recently forwarded to the Senate the nomination of Col. Charles H. Danforth to be Assistant to the Chief of the Air Corps with rank of Brigadier General for a term of four years from the date of acceptance. Colonel Danforth is recommended to succeed Brigadier General William E. Gilmore whose retirement became effective June 30.

THEY DUG HER OUT OF ICE AND FLEW TO THE POLE!



NORTHERN lights "have seen queer sights," but last November those that gleam over Antarctica's ice gazed down on an astounding scene . . . .

They saw a crew of men crush a white mound with picks. Out of the ice, where it had been packed for months, they saw a great airplane appear. They watched the men bring it back to life . . . testing and adjusting each part . . . checking the three Wright engines with the care of scientists.

They heard the motors' song split thin air. Frozen power throbbed again. Four men climbed in . . . skimmed the ship over ice . . . up . . . and streaked off for the Pole.

For 16 hours the stars heard the engines sing. Over mountains of rock, seas of snow, chasms of ice the ship hurled south to the Pole . . . *over it!* . . . around it, and back to the base—safe from the bottom of the world!

Rear Admiral Byrd, Bernt Balchen, Harold June and Ashley McKinley were the men. The "Floyd Bennett" was the plane. A giant "Cyclone" and two great "Whirlwinds" sang the historic song.

Home again, after the gruelling flight, Wright welcomes the Byrd party. No men, no motors, nor airplane have ever shown more courage—endurance!

WRIGHT

AERONAUTICAL CORPORATION

PATERSON, NEW JERSEY

A DIVISION OF CURTISS-WRIGHT

TECHNICAL

CURTISS-BLEECKER HELICOPTER

TESTS are being conducted with the Curtiss-Bleecker helicopter, which for some time has been under secret development in the Garden City factory of the Curtiss Aeroplane & Motor Company. This unusual machine is undergoing a long series of tests to determine its efficiency and performance characteristics.

The problem of successful helicopter design is one which has intrigued scientists for centuries and which has undoubtedly attracted more attention and more original effort by inventors than has any other phase of aeronautical design.

The first helicopter is said to have been designed in the eighteenth century and was used merely as a toy. Since that time, there have been literally thousands of attempts to develop such a machine, many of them by prominent engineers and scientists all over the world. The slow progress in solution of the problem is a measure of the tremendous difficulties encountered in developing a successful design.

The true helicopter is a flying machine that will be able to lift itself vertically off the ground, to hover indefinitely over a given spot, to descend vertically under its own power, and to achieve safe descent in event of engine failure, in addition to being able to move horizontally at satisfactory speed and to being controllable and satisfactorily stable under all flight conditions.

There have been any number of helicopter designs that have successfully lifted themselves off the ground vertically and in some cases attained considerable altitudes, but so far as is known, there has been none which has satisfactorily combined all of the other performance elements of the true helicopter to a degree that makes it a practical machine.

The development of the Curtiss-Bleecker helicopter has involved four years of intensive research and study in the Curtiss-Wright Engineering Laboratories under the direction of T. P. Wright, chief engineer, and M. B. Bleecker, inventor of the machine. The original principles of the helicopter were evolved by Mr. Bleecker while he was a student of the University of Michigan. Bleecker experimented with the design during his studies at Michigan and later when he was employed in an engineering capacity by the National Advisory Committee for Aeronautics at Langley Field. In the early part of 1926, his original plans were submitted to the Curtiss Aeroplane & Motor Company and the company began its development. There followed a year and a half of research and wind tunnel testing to determine its flight possibilities.

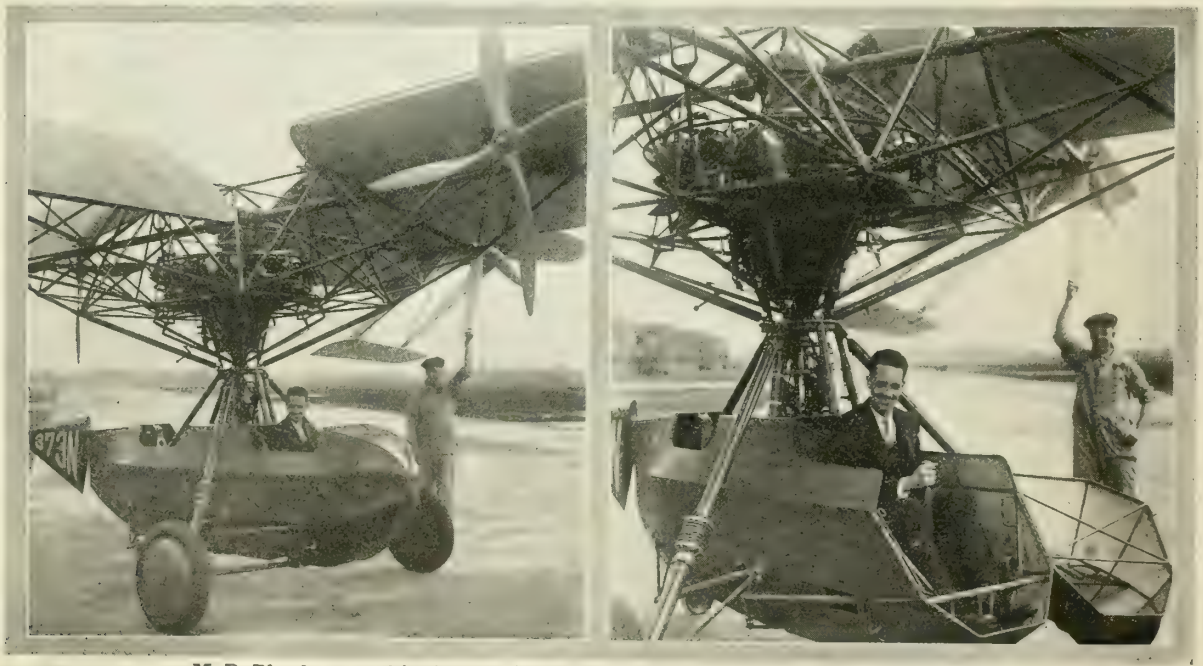
Immeasurable difficulties were encountered in making an intelligent engineering analysis of the problem. As an example, the hovering condition of flight, in which the machine remains stationary in the air over a given point, could not be simulated with the regular wind tunnel equipment, and it was necessary to devise special methods and build special apparatus for this and a number of other tests of the machine.

As another example, the cooling of the engine operating in its rather unusual position, without the cooling effect of the usual propeller slipstream, presented difficulties, and it was necessary to make a special study of the problem of cooling and cowling design, which became a major problem in itself, although really distinct from pure helicopter design.

Another year was spent in the detailed design of the machine, and here, again, it was necessary to devise entirely new methods, particularly in making stress analyses for the unusual conditions encountered. All of this work was done under Mr. Bleecker's supervision.

Curtiss engineers make no prediction as to the performance of the helicopter until flight trials are completed, beyond expressing their confidence that it will rise vertically, hover over a given spot, descend safely vertically, and move horizontally at reasonable speed.

This first machine has been designed primarily to meet these general requirements satisfactorily and has not been specifically designed to accentuate any particular feature of performance, such as high speed, or rate or climb, or load-carrying ability, as is done in design of present-day aircraft.



M. B. Bleecker seated in the cockpit of the newly completed Curtiss-Bleecker helicopter



The Curtiss-Bleecker helicopter which is undergoing tests at Valley Stream Airport, Long Island

Such specialization can be accomplished once the general principles of the machine are established as correct. The preliminary tests will be conducted over a period of several weeks and will consist of detailed check of the performance of every feature of the machine before actual flight trials are made.

The Curtiss-Bleecker machine consists essentially of four large wings or blades mounted at right angles to one another and revolving in a horizontal plane. The wings have an over-all span of 47 feet 4 inches; near the center, the chord is 66.75 inches; and the total lifting area is 322 square feet. The wings are revolved by means of four four-bladed propellers, one to each wing, mounted forward of the leading edge, about nine feet from the center of the machine. The Hartzell wooden propellers, which are 6 feet 9 inches in diameter, are driven through a gear and shaft arrangement from one central Pratt & Whitney Wasp air-cooled engine, which is mounted horizontally with the propeller shaft pointing upward. To each of the wings are attached outriggers on which are mounted elevators or tail surfaces. These surfaces, called "stabovators," each have an area of 12.5 square feet. Thus, each of the four units is in reality arranged as a small airplane, consisting of a power-driven wing with a tail which controls the angle of incidence of the wing to which it is attached.

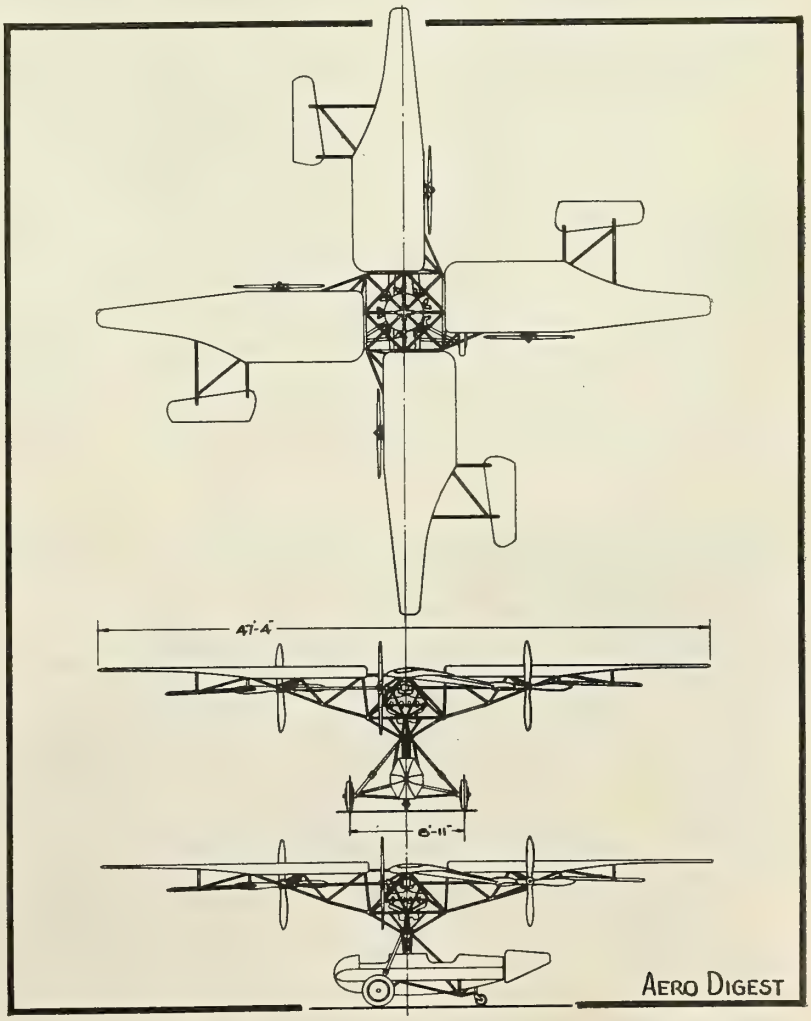
The angle of the main panels is controlled solely by the stabovators, which are operated by pilot's control stick to which they are connected. The stabovators (and, therefore, of course, the main panels to which each is attached) are operatable independently, as necessary for directional control, such as is common to ordinary aircraft. For rising and descending the stabovators are operated in unison by means of a lever at the left of the pilot's seat.

The Göttengen 387 wing curve is used for the wings which are built up with six spruce and plywood beams. Two-ply spruce planking covers the greater part of the wing panel, fabric covering being used near the trailing portion where the loads are lightest. Each panel is hinged at two points, which are located from the leading edge at a distance of about 30 per cent of the chord. Panels may be operated through a range of from minus 12.5 degrees to plus 27.5 degrees.

The structure supporting the wings is of dural and chrome-molybdenum tubing throughout. Beneath the four wings is suspended a small fuselage or car built up with a fabric-covered light tubular framework in which are located the pilot's cockpit at the forward end and a seat for a passenger or mechanic at the rear. To preserve the correct fore-and-aft balance of the machine, it is necessary to carry a load in the rear seat approximately equal to the weight of the pilot.

A conventional type stick and rudder bar are used to control the movements of the helicopter. Since the body is free to rotate about the central axis, the balanced rudder is pivoted about a longitudinal horizontal

(Continued on next page)



Three-view scale drawings of the Curtiss-Bleecker helicopter

(Continued from preceding page)
axis instead of vertical; thus, to turn the car to the left, left rudder inclines the rudder so that the air from above strikes it on the left side, causing the nose of the car to swing toward the left.

Movements of the stick cause the vanes to raise or lower to correspond with the required maneuver; for example, pushing the stick forward causes the panels as they approach the rear (during their rotation) to exert greater lift than the forward panels. It is expected that the machine will rise with the panels rotating at about 60 revolutions per minute and that high speed or greatest lift will be achieved at about 120 revolutions per minute. For maximum speed in forward flight the vertical axis (and of course the body or fuselage) is tilted forward about fifteen degrees. The machine is unable to taxi and take-offs and landings are made vertically, with no run on the ground.

The landing gear is provided with oleo and rubber disc shock absorbers, and the wheels have a vertical travel of eighteen inches. Goodrich Silvertown 30 by 5 inch tires are used. The trail wheel, of Westinghouse Micarta, has a vertical travel of eighteen inches and, being mounted in caster fashion, is free to travel in any direction.

The vertical main shaft is set above the body on a mounting ring about twelve inches in diameter, containing deep groove SKF ball bearings. The lower mounting at the bottom of the shaft is also ball bearing and the body is free to turn in any desired direction.

Many of the metal units were heat-treated where necessary to increase their strength. The entire engine mount assembly was heat treated before installation. Lubrication and cooling of the engine became one of the major problems of design. The Pratt & Whitney Wasp engine is of the geared type rated at 420 horsepower at 2,100 revolutions per minute. The standard gearing turns the main vertical shaft at 1,050 revolutions per minute, four horizontal drive shafts are geared up to 1,420 and at the propellers a bevel gear steps up the revolutions per minute of the propeller shaft to 1,530 revolutions per minute. It is expected that the gearing will result in a power loss of not greater than three or four per cent.

Above the engine a two-bladed horizontal metal fan or propeller about 42 inches in diameter is rotated at crankshaft speed to act as a means of cooling the engine cylinders and the oil. Special oil coolers are located between each cylinder. The operation of the cooling fan absorbs only fourteen horsepower, and it has been found adequate for its purpose.

An aluminum fuel tank is located in the fuselage and it revolves with the vertical shaft. Its capacity is 30 gallons. Oil is carried in a tank just below the engine. The oil capacity is four gallons. All engine instruments are of the vertical scale type. All are mounted on and revolve with the central shaft, and approximate readings are possible while the shaft is in motion. Other instruments are located in the pilot's cockpit. The front portion of the pilot's cockpit is hinged at the left side and may be swung open for easy access and egress.

Fully loaded, the helicopter weighs about 3,400 pounds. Its useful load is approximately twenty per cent of its weight. In this first experimental machine no attempt is to be made to achieve high speed, but the normal high speed expected is in the neighborhood of 70 miles an hour. Detailed information on performances will be available when flight tests have been completed.

AERONCA equipped with FLOATS

THE launching of the Aeronca seaplane, which is shown on the front cover of this issue, took place during the first week in June on the Ohio River at Cincinnati. The time required for the take-off, in calm air from smooth water, was seven seconds. The seaplane climbed to 1,000 feet in three minutes and to 2,000 in six minutes. According to reports the seaplane handles very much like the land job.

The speed of the seaplane is slightly less than the speed of the landplane. Speed tests conducted against a landplane showed about two miles per hour less at top speed for the seaplane. The top speed of the landplane is 85 miles per hour. Therefore the top speed of the seaplane is rated at 80 miles per hour.

On the Aeronca there are two pontoons ten feet long, made by the Aircraft Products Corp., of Detroit. The total weight of the gear is 103 pounds. The total weight of the ship empty with pontoon equipment is 470 pounds. With pilot, gas and oil, the ship weighs 696 pounds. The normal take-off time is 10 seconds. With a 160-pound passenger and 160-pound pilot, the plane takes off in thirty seconds. The top speed shown by the seaplane is 80 miles per hour. The cruising speed, with motor turning 1,900 revolutions per minute, is 60 miles per hour. No altitude tests have been made as yet. The landplane is convertible into a seaplane with the addition of floats and a few minor fittings.

The front struts joining the pontoons to the fuselage are attached so that they are practically an integral part of the fuselage design. The same connections that hold the flying wires hold the lower struts, and the tubing that carries the wing attachment also carries the top front strut attachments. The rear pontoon struts come up at an angle and are fastened to the outer longeron of the "Y" forming the fuselage structure. Additional bracing wire is attached to the joint of the axle clamps.

Specifications

Length	19 feet 3 inches
Wing area (incl. ailerons)	175 square feet
Rudder area	17 square feet
Elevator area	24 square feet

Performance

High speed	80 miles per hour
Cruising speed	60 miles per hour
Stalling speed	35 miles per hour
Climb with full load	600 feet per minute
Take-off run	95 feet



View of the Pratt & Whitney powered Curtiss-Bleecker helicopter from above



AMERICAN EAGLE CABIN PLANE

FOUR—PLACE FOLDING WING MODEL 430

THE newest addition to the line of the American Eagle Aircraft Corporation, Fairfax Airport, Kansas City, Kas., is Model 430, a four-place folding wing cabin monoplane, powered either with the Continental Seven or the Wright J-6 Five engine.

A total of 22.5 square feet of Triplex glass is used in the windows of the 430 American Eagle, providing a good range of visibility. The entire center section is open, the pilot and front seat passenger being protected from the sun by a curtain which is adjustable to permit full vision above at a moment's notice.

Entrance to the cabin is by three doors, two forward and one right rear. The forward seats are easily adjustable in flight. A minimum of 34.5 inches leg room is built into the rear compartment, which space is increased five inches when the front seats are adjusted. The adjustment on the forward seats is unusual. By pressing a lever, the seats move forward and upward. This permits a pilot of short stature to increase his range of vision and also permits him to sit closer to the rudder and brake assembly.

The heater outlets, connected to the exhaust stack, provide comfortable temperatures in the cabin in cold weather. These outlets are placed fore and aft, and are operated by pressing a vent release with the toe of the shoe. They are shut off in the same manner.

A large baggage compartment is built into the rear of the passenger compartment. It is accessible from the interior of the cabin.

A short streamline step is placed at a convenient height above the ground to facilitate entrance by the rear door.

The instrument panel is completely outfitted, and the starting mechanism is mounted on it, as is the case with many of the more modern motor cars. The plane carries navigation lights and is wired for landing lights.

A rear-vision mirror is mounted on a strut over the instrument panel.

The wings may be folded back to permit parking in a space 13 by 25 feet. This operation requires two men and about five minutes' time.

The landing gear tread is 108¾ inches. This gives an ample safety factor under almost all conditions and gives the pilot assurance his ship is going to make a firm setin. A tail wheel is used on the ship.

A fine adjustment is provided for the horizontal stabilizer. The adjusting mechanism is readily accessible, being placed to the right of the pilot's chair and on the floor.

Construction of the Model 430 American Eagle is conventional throughout. The fuselage and control surfaces are of welded steel tubing. The wings are conventional in construction, and the entire ship is fabric covered.

The wing curve used is STAe-10c, which gives a high lift characteristic and in addition provides good speed. The wing has low drag characteristics.

Fuel tanks are carried in the wings, the gasoline capacity being 60 gallons. This provides fuel sufficient for a 550-mile cruising radius. The oil capacity is 7.5 gallons.

Model 430 American Eagle is built under two Approved Type Certificates, Nos. 301 and 302, these covering manufacture with the Wright J-6 Five and Continental Seven engines, respectively.

Performance with either power plant virtually is identical. The plane takes off in 7.5 seconds and lands at approximately 45 miles an hour. The rate of climb in the first minute is 950 feet.

One standard paint job is offered, emerald green with chrome yellow wings. Other colors may be had at the option of the purchaser.

Specifications

Span	41 feet
Length overall	24 feet 1 inch
Height	8 feet 4 inches
Chord	70 inches
Wing area	233 square feet
Stabilizer and elevator area	37.8 square feet
Fin and rudder area	16.54 square feet

Weights

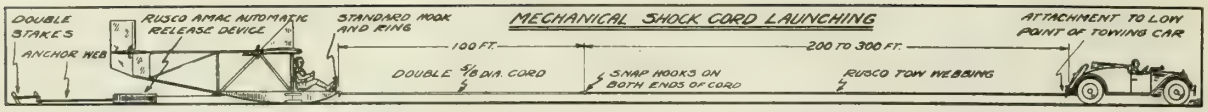
Weight empty	1,864 pounds
Useful load	1,133 pounds
Payload	550 pounds
Gross weight loaded	2,997 pounds
Wing loading	12.86 pounds per square foot
Power loading	18.16 pounds per horsepower

Performances

High speed	127 miles per hour
Cruising speed	106-109 miles per hour
Landing speed	45 miles per hour
Climb	950 feet first minute
Service ceiling	16,500 feet



Views of cabin interior showing seating arrangement of American Eagle Model 430 monoplane



MECHANICAL LAUNCHING OF GLIDERS

R. E. DOWD

Aeronautical Engineer, Russell Manufacturing Co.

THE widespread interest and activity in the building and flying of gliders has been the occasion for a great deal of discussion and speculation in the aircraft industry, as to its possibilities and future. Many airplane manufacturers have added gliders to their line of products, and other companies have sprung up for the sole purpose of manufacturing gliders and conducting schools.

After witnessing glider flights under usual conditions such as on an open field, airport or golf course where opportunities for extended flights are limited, the layman usually voices his opinion that it is a lot of hard work for the amount of sport involved. He perhaps has read of the record breaking flights elsewhere but concludes that the local machines or pilots are inferior. In short, after his curiosity, which has been whetted by news reports, is satisfied he goes away with a "much ado about nothing" impression of the whole demonstration.

Gliders have been flown on an increasing scale in Germany since 1920. The national contests are the great aviation sporting event of the year. Through all this development the method of launching has remained practically unchanged. The power element has been a "Vee" sling of rubber rope or, as called in America, shock cord. One, two or three lengths of cord were used, depending on the weight of the machine or the power required. The energy stored in the rope was of a *manual* source. Four to eight men tugged with "might and main" on each end of the sling, with the usual reward of plunging headlong over each other when the holding crew of two to five men released the tail of the glider.

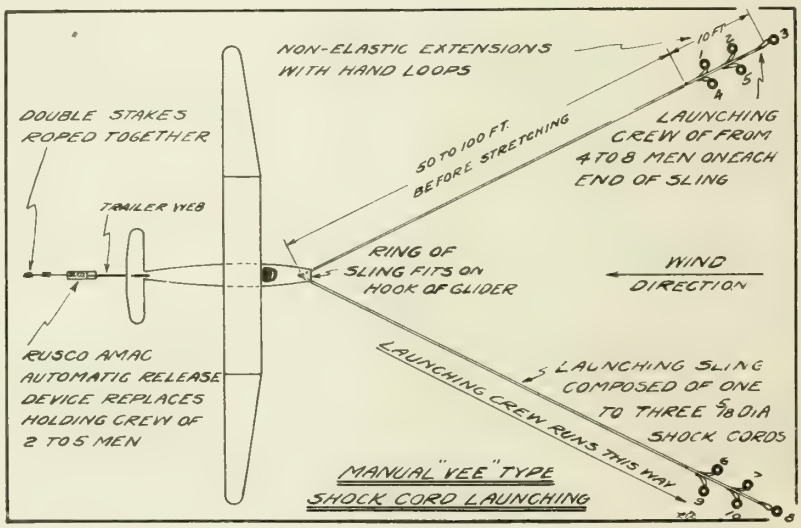
Perhaps this is the best system. Perhaps our German brothers have tried and discarded all possible forms of mechanical devices. But American experimentors are reluctant to accept this for granted. They seem to have a different reaction to all this work. Rather than a spontaneous acceptance of this order of things as a good way to exercise, they hesitate, reconsider and sometimes divert discussion to light planes commonly called "power gliders". We recall that American youth often drives his car to the gymnasium rather than walk, takes his specialized exercise and returns to his home in his car. In other words when he flies, he flies, when he exercises he does just that. Perhaps we have here another example of the American system of directness.

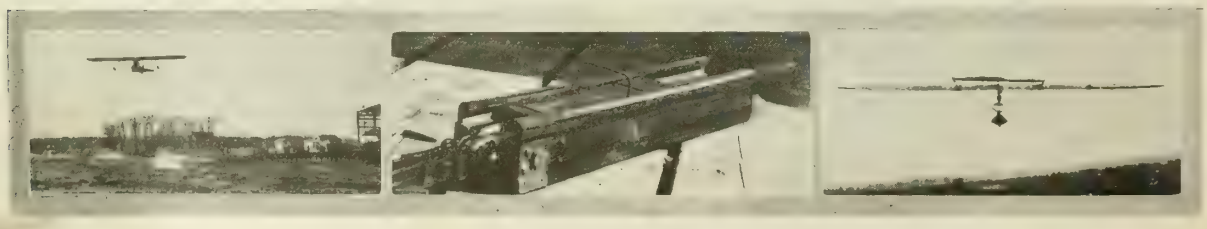
At any rate, a mechanical system of launching has made its appearance as the result of combined efforts of the American Motorless Aviation Corporation and The Russell Manufacturing Company. Mr. Heinrich Knott, German soaring pilot formally associated with AMAC as an instructor, and also American representative of the Rhön-Rossitten Gesellschaft, is chiefly responsible for a very effective mechanical system of automatically releasing a glider when a predetermined tension has been applied to the shock cord. This unit was further developed by the writer for production by The Russell Manufacturing Company.

When conditions of operation permit the free use of a car, the arrangement is as shown in the drawing. It will be noted that the release device is firmly staked to the ground using double stakes roped together for safety. The launching assembly consists of double strands of 5/8 inch shock cord 100 feet long with suitable extension of rope or webbing, the latter being more reliable and less likely to tangle.

The drawing at the top of the page shows the shock cord attached to the glider and the extension attached to the car. By reversing this arrangement and using an extension possibly longer than 300 feet the pilot is completely protected in case of failure of any element of the launching system. Likewise the occupants of the towing car will be protected by the low attachment of the cord to the car. Limitating factors governing the length of the extension are simply the size of the airport or field used for flying and the weight of the tow line.

There are several interesting variations from this general system of mechanical launching, one of which is shown in the cut. In this instance the flights were made from a seaplane ramp which extends into the water at Port Washington, New York. The glider used was the AMAC secondary type of the same design as that used by





The automatic release device for gliders in use. The seaplane glider at the left is launched from a runway

Lieut. Barnaby for the descent from the dirigible Los Angeles. A sort of a sponson type pontoon was built under the fuselage and small balancing pontoons added to the wings. A motor boat was substituted for the towing car and the take offs were made directly from the ramp without touching the water. The flights therefor may be classified as amphibian flights inasmuch as the landings were made on the water.

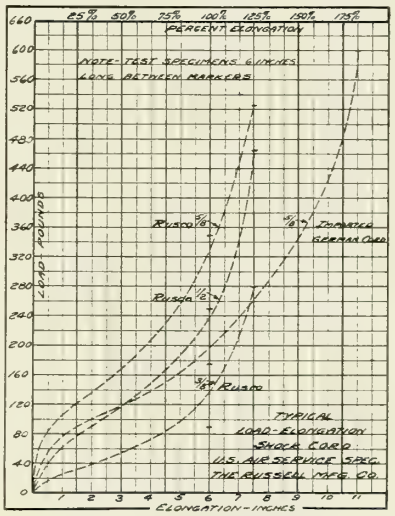
The take offs were doubtless aided by a rather brisk wind but even this was not indispensible, since ten to fifteen feet of ground travel usually sufficies to get the average glider into the air.

In the cut, the splash under the glider was caused by the tow rope falling from the glider hook when the altitude became sufficient. Although the motor boat had a speed of approximately twenty-five miles per hour, the glider almost overtook it before alighting. Several flights of this kind were made with singular success.

Another variation is in the attaching of the release device to the front end of a car *and setting the brakes firmly,* instead of staking it to the ground. This eliminates the necessity of driving stakes for anchoring the release device and permits easy changing of the point of take off to allow for changing wind directions. Over level ground, such as airports, the anchor car can follow the glider to the landing point and a new flight started from this point without the customary delay of retrieving the glider. In fact in fairly calm conditions a sort of a "leap frog" series of flights can be made up and down the airport with ease and dispatch. The required crew for this is simply three men, the towing car driver, the pilot and the assistant who steadies the wing tip of the glider during the take off and then hops aboard the anchor car and drives to the landing point. The assistant is particularly necessary when a strong wind is blowing in order to avoid upsets.

With skill and experience this mechanical launching permits return flights to the starting point over level ground and in a calm, this having been demonstrated at Troy, Ohio, with a Waco primary type glider.

It is not considered advisable to use shock cord beyond an elongation of 100 per cent (see chart). From the chart it will be noted that the standard German cord has a somewhat lower test than U. S. Air Service Specification shock cord, but much of this difference is lost because of the "Vee" arrangement of the sling commonly used in Germany. Pilots have universally endorsed the performance of standard American 5/8 inch diameter cord when used as a sling under either straight or "Vee" conditions. In fact, they fail to note any difference between the performances of this cord and the imported material. With a setting of 200 pounds on the release device, elongations of 75 per cent were noted on the double 5/8 inch cord at the time of release. This corresponds to about 230 pounds on each strand, or 460 total. The additional 260 pounds is accountable for in ground friction. Under such conditions flights with primary and secondary gliders have been recorded of approximately one quarter of a mile over level ground.



Shock cord curves showing load-elongation characteristics

This same general system of launching has been used with the "Vee" type sling where conditions would not permit the use of a car (see diagram). For such conditions it was further proposed to stake a pulley in the ground in advance of the glider and reverse the towline so that the car can operate in the rear.

In using the Vee type sling a single piece of rope or webbing at the apex of the Vee of a length of fifteen to twenty feet will move the projected line of shock cord tension to a point in advance of the pilot, thereby safeguarding him from possible injury in event of the launching crew accidentally releasing the cord or of a failure of any part of the launching sling system. There will be a slight loss of directional control at the instant of the take off, from the more conventional system of using a ring secured at the apex but the increased safety to pilot would seem to compensate fully for this.

Still another variation of the mechanical form of launching has been used successfully at the Parks Air College in East St. Louis. In this case, the ends of the sling are staked to the ground and the glider towed backwards through the release device mounted on the tow car. This would seem to lack the safety of other systems, inasmuch as the release would cause a sudden reversal of direction and the embryo pilot would very likely become confused.

Glider fans have been more than inquisitive as to just what sort of a mechanism was contained in the so-called "Magic box" which has been in regular service on so many Eastern airports. The accompanying diagram tells the story.

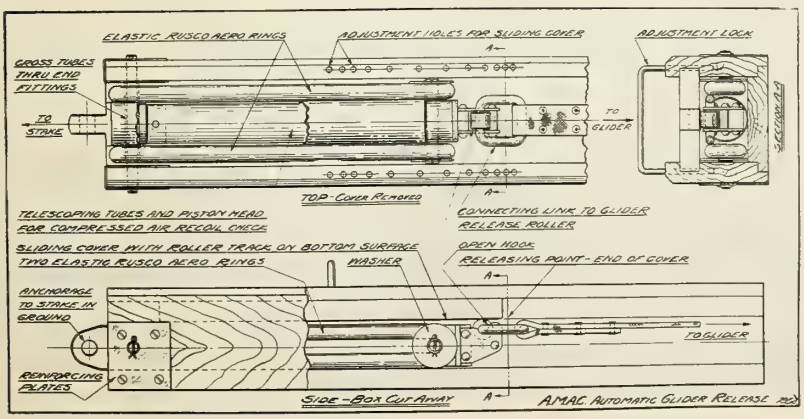
The telescoping tubes furnish a guide for the extension of the Rusco aero rings which are looped over cross legs. The tension is applied to the mechanism through a short connecting strap which attaches to the rear of the glider. This connecting strap has a small link on the end which hooks over an open hook. As the tension is applied the link tends to unhook but is restrained by the cover. A metal track on the under side of the cover permits the roller to run along until it rolls off the edge. This is the point of release and is adjustalbe through the sliding of the cover. A lock is provided to fix the cover location at points from 50 to 400 pounds on 50 pounds increments. A compressed air recoil check is provided to absorb the recoil after releasing.

The National Glider Association has emphatically discouraged any system of launching for beginners except the shock cord method. It would seem that such a mechanical system which prevents the beginner from receiving excessive starting power would be a further safeguard.

At the recent glider meet at Bayside, L. I., the judges ruled that a restraining force greater than 200 pounds would not be permitted. This was done because of the great numbers of inexperienced pilots who were participating. It was found that two men holding the tail of a glider were exerting a pull of approximately 100 pounds. Events were run off without mishap, and in cases where pilots of no experience were being launched, the adjustment of the release device was reduced to a safe condition and stepped up by degress as experience was acquired.

An element of danger not ordinarily as-

(*Continued on page* 183)



Construction of the A. M. A. C. automatic glider release device

ALEXANDER "BULLET"



Front view of the new Alexander Bullet with streamline landing gear

APPROVED Type Certificate 318 was awarded the Alexander Bullet on May 6 by the Department of Commerce. This ship is the first low-wing cabin monoplane and the first cabin plane with retractable landing gear to obtain government approval.

Simultaneously with notice that approval had been won, the Alexander Aircraft Company stated that the Bullet is being put into production. Output is to be increased as market requirements demand.

The Alexander company announced the Bullet a year ago. In final tests, however, the experimental model revealed bad spin characteristics and had to be redesigned. The approval awarded recently concludes months of engineering research in overcoming spin trouble.

In the new design, the fuselage is lengthened, the tail surfaces changed, the cabin made larger and more roomy. Wing span is shortened and a high-lift airfoil is used.

The approved Bullet is powered with the Wright J-6 five-cylinder engine developing 165 horsepower. It carries four people; figuring 170 pounds each to three persons and 100 pounds of baggage, the payload is 610 pounds.

Preliminary analysis of various airplane types preparatory to the design of the Bullet demonstrated that the low-wing cantilever ship possessed several advantages.

Structurally the low-wing airplane is considerably lighter for the same carrying capacity and strength. Heavy diagonal bracing in the fuselage is eliminated. Pilot and passengers, gasoline, baggage and landing gear rest directly on the wing, producing no stresses in the fuselage structure. Since all load is carried directly on the wing, there is practically no change in balance with varied loadings. The wings, being low, permit higher speed range because the landing speed is decreased by the cushioning ground effect. Take-off is proportionately quicker.

During sea level flight tests the Bullet took off in 17 seconds with full load. Climb was approximately 700 feet per minute.

Bullet wings are in three sections, giving a span of 36 feet. The center section has a span of 13 feet 10 inches; its spars passing through the bottom of the cabin, beneath the passengers. Spars, both in the center section and in the wing tips, are of box beam construction. Deep drag trussing in a simple arrangement developed by Alexander engineers is used throughout the wings. There are no exterior wires or braces.

Standard equipment of the Bullet will include a choice of a retractable landing gear or the gear streamlined with fairing. It is pointed out that, although the retractable gear adds several miles an hour to speed, many purchasers have expressed a preference for the streamlining only.

The method of retracting the gear is interesting. A ratchet lever between the front seats draws the wheels up and back into the wings, thus practically removing the last bit of parasitic resistance. Wishing to land, the pilot has merely to release a trigger and the landing gear drops into landing position. A double safety lock keeps the gear in its extended position. It is not possible to release this lock unintentionally.

The Bullet embodies several safety advantages peculiar to the low-wing cabin plane. There are no heavy structural members above the passengers and pilot. With wings near the ground, the plane's low center of gravity reduces the possibility of a nose-over. Still another safety feature of interest is that the pilot and his companion are seated in the second bay, instead of the first.

Shock is absorbed in the Bullet landing gear by a combination of spring and oleo types. Bendix wheels and brakes are standard equipment, with a hydraulic control system developed by the Alexander research department.

Control is simplified in a manner possible only in the low-wing type of plane. Push and pull tubes operate the Friese balanced ailerons, with all mechanism within the wing. Inspection windows are placed at strategic points to facilitate inspection of critical parts in the control system. Dual stick control is standard equipment. Either stick may be easily removed. The adjustable stabilizer control is located above and between the pilots' seats within easy access of either.

Gasoline capacity of the Bullet is 44 gallons. The main tank is located under the floor of the cabin. A reserve tank, holding four gallons or a supply sufficient to cruise for 30 minutes, is placed in front of the instrument board. Fuel is carried from the main tank by an AC fuel pump and from the reserve by gravity.

Flying and landing lights are standard equipment. Flying lights are streamlined in the wing tips and fin. Landing lights are sunk in the leading edge of the wing.

The interior of the cabin is handsomely finished in brown. Seats are upholstered in genuine leather. Walls and ceiling are covered with leatherette. The floor is carpeted. Seats are well cushioned and tilted at an angle to allow the passengers to assume a comfortable position. There is space between the seats to permit passage to and from the door, which is in the rear of the cabin.

Visibility is excellent from all seats. Shatter-proof glass is used for all pilot windows. Windows slide open for ventilation.

Specifications

Wing span	36 feet
Wing area	208 square feet
Length	26 feet 10 inches
Height	7 feet 9 inches
Gross weight	2780 pounds
Weight empty	1720 pounds
Disposable load	1060 pounds
Payload	610 pounds
Wing loading	13.3 lbs. per square foot
Power loading	16.9 pounds per h. p.
High speed	148 miles per hour
Cruising speed	124 miles per hour
Landing speed	48 miles per hour
Climb (full load)	about 700 feet per minute
Take-off (full load)	17 seconds



The new low-wing Alexander Bullet, recently granted A.T.C. No. 318

NEW TYPE PIONEER INSTRUMENT PANEL

A NEW instrument panel has just been developed by the Pioneer Instrument Company, subsidiary of Bendix Aviation Corporation. The panel contains an oil pressure gauge and a thermometer for the oil and water. A dual ignition switch with a lock connecting either or both magnetos is provided in addition to a fuel level gauge and flow meter showing amount of fuel in the tank and the rate at which it is being consumed. There are an air speed indicator, a turn and bank indicator, and an earth inductor compass (which includes a generator and controller), an altimeter, climb indicator, a clock, air distance recorder, voltmeter, ammeter and rheostats.

CURTISS TYPE XBT-4 BASIC TRAINING PLANE

A NEW basic training plane was delivered recently to the United States Army Air Corps by the Curtiss Aeroplane and Motor Company. The Curtiss XBT-4, as the plane is designated, is the first of a new series of distinctly military planes for advanced training of attack, light bombing and observation pilots. It was produced in the Curtiss-Wright experimental plant at Garden City, Long Island.

Since pilot's vision is one of the most vital necessities in a training plane, T. P. Wright, chief engineer for Curtiss, concentrated upon this feature in the new plane. The rear cockpit, in which the instructor sits, has been raised higher than in former models. The cowling, instead of being rounded, is squared and sloped to give equally good vision forward, to the right and to the left. The cowling also slopes, from both cockpits, at an angle six degrees below the wings, which are well staggered. The windshields have small frontal area and wings which keep drafts off the pilots. They are arranged to permit easy egress in emergencies.

Another new feature in the Curtiss XBT-4 is a large mirror mounted in the upper wing over the student cockpit. This gives the instructor an opportunity to watch the student pilot at all times and observe his technique.

As an innovation in safety, a new method of mounting a full-thickness sponge rubber pad over the instrument board has been adopted. This has openings cut through to expose the dials. The navigation instruments are grouped in the center and are lighted indirectly. The electrical instruments are on the left and the engine instruments on the right.

Comfort for the pilots has been well planned in the XBT-4. The seats, which may be raised or lowered 7.5 inches, are tilted back at an angle of 13 degrees from level. Neatness of the cockpit interiors is enhanced by concealing all mechanism behind the wooden veneer walls. The mechanism is still easy to reach for work or inspection through large laced panels.

The wabble pump is arranged above the throttle. This makes it easy to reach and operate, as well as preventing difficulty in the arrangement of the stabilizer control of which only the handle protrudes into the cockpit. All controls, except the flying controls and the radiator shutter, are operated with the left hand, leaving the right free at all times for the stick.

The Curtiss XBT-4 is handled with a straight stick. The rudder and brake pedals are easy of action. They are swung on a radius of more than 17 inches which gives good leverage with the least variation of direction. The straight stick has its maximum throw well within the range of the arm from the normal sitting position. The controls are effective and easy to operate, having the maximum of mechanical advantage. The pedals may be adjusted over a radius of four inches.

The new basic training plane has two baggage compartments, the larger taking two ordinary suitcases.

The power plant is the Curtiss D-12 engine of 435 horsepower, water-cooled.

The Curtiss XBT-4 has a long operating range. With gasoline tank capacity of 164 gallons, the D-12 using 18 to 20 gallons per hour, the plane will cruise at 120 miles per hour more than 1,000 miles without refueling. High speed is 143 miles per hour.

MIKO SPARK PLUGS

THE AC Miko spark plug, designed for installation on aircraft engines, has been developed by the AC Spark Plug Company, Flint, Mich. These spark plugs are graded according to heat range to provide for every operating condition under which an aircraft engine may be operated. A chart recommending the type of spark plug to use according to the manufacture of the plane, engine installation and conditions of flight to be imposed, has been prepared by the AC company.

The AC Miko spark plug is built of laboratory-tested mica and is plated with steel shell chrome to prevent rusting. This plug is designed to be gas tight by the use of brass seal bushing, which is heated, compressed and plastically moulded in position in assembling. The side electrode is electrically welded to provide increased electrical and heat conductivity. The terminal is fused to the center electrode, and the design of the side electrode facilitates regapping. Possibility of spark flash-over at high altitudes is minimized by means of a long insulation between the terminal and the steel shell. These spark plugs may readily be demounted for inspection and cleaning.

RUSCO BELT FOR PRIMARY GLIDERS

THE Russell Manufacturing Company of Middletown, Conn., announces a new safety belt specially designed for use with primary gliders. The design was worked out in coöperation with the American Motorless Aviation Corporation, of New York City, to the specifications of Mr. Heinrich Knott, well-known engineer and soaring pilot.

Features of the new belt are the positive lock fastener and the eight-inch wide waist band which gives support and protection to the pilot. Both ends are easily adjustable through a friction type buckle similar to the design used on parachute harnesses.

The belt is furnished with or without special elastic connecting links consisting of Rusco Aero Rings. The foreign belts employed steel spring shock absorbers and were fabricated from a material furnishing less support to the pilot's body.

Among the prominent pilots who have tried out this new belt are: Miss Elinor Smith, Mrs. Betty Hyler Gillis, Mrs. Kieth Miller, Mrs. Ralph Barnaby, Governor Trumbull, Mr. Dick Atwater, Captain Pippig, Lieutenant Barnaby and Major Biddlecomb.



Powered with the D-12 engine, the Curtiss Basic Training Plane has a speed of 143 miles per hour

AIRPLANE PERFORMANCE CHART

By
Andrew J. Fairbanks

WHEN still unversed in the science of aerodynamics and seeking to learn all that was possible about the subject, I happened upon the foundation of what later developed into an airplane performance prediction chart which it is the purpose of this article to present.

There were many variable factors which appeared to affect the performance of an airplane and they apparently were thoroughly interconnected and involved. Two, however, appeared to be most promising. These were the wing loading (pounds per square foot) and the power loading (pounds per horsepower). Hence the first idea to be grasped was to plot on coördinate paper one function against the other for all airplanes for which data were available. These data were few and the resulting graph took on a hyperbolic form. This was indeed promising as far as it went. Later, with more data available, the curve soon lost its form and the error became apparent, but the fundamental idea remained.

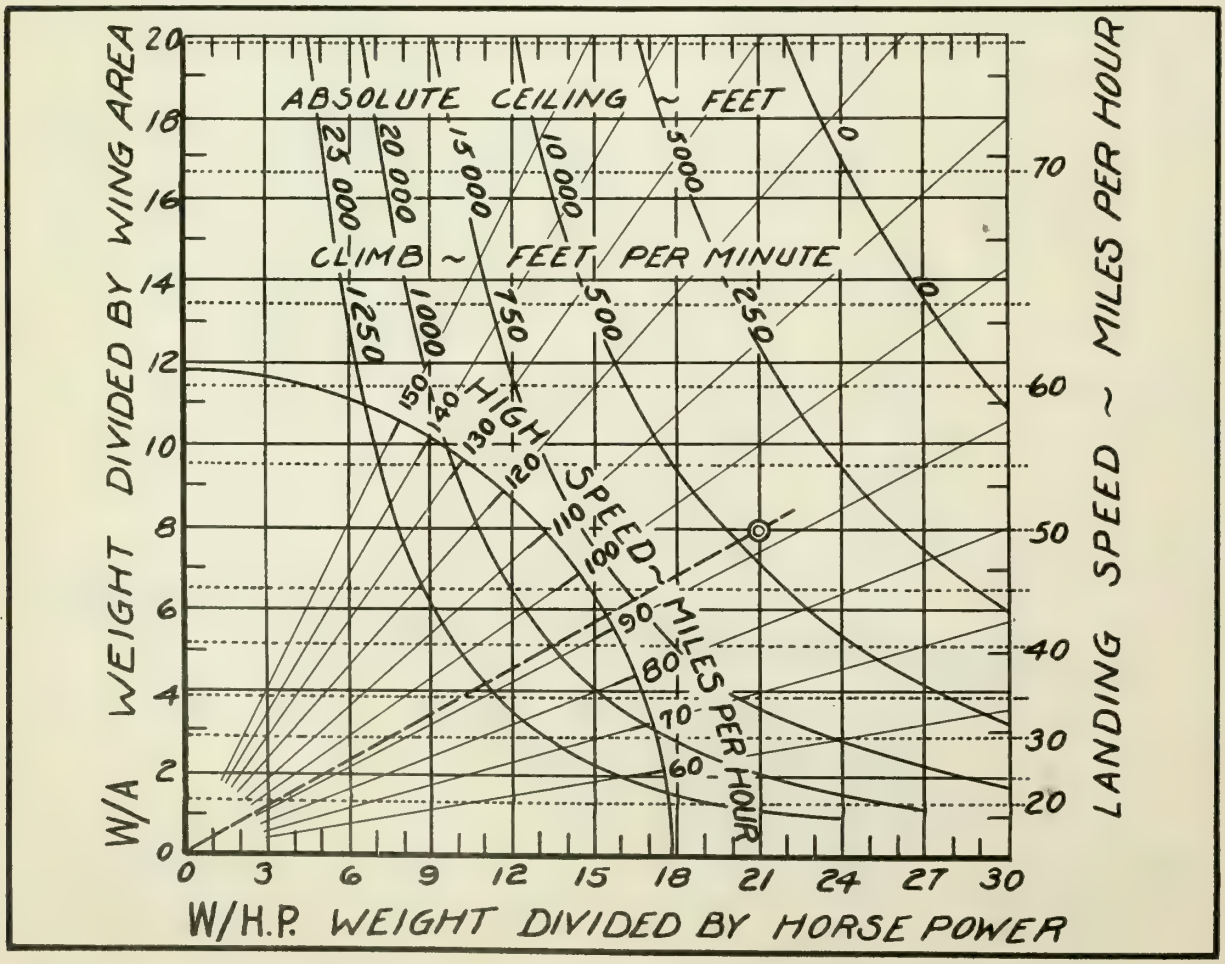
The problem then became to develop an empirical chart from which the approximate performance of an average airplane could quickly be determined and the effect of the main variables noted. To accomplish this, it was first necessary to study the qualities to be thus determined.

The stalling or landing speed was first considered. This is known to be represented by the equation:

$$Vs = \sqrt{\frac{\text{wing loading}}{\text{max. lift coefficient}}} = \sqrt{\frac{W/A}{Ky\ max.}}$$

Thus we see it is affected by two variables, W/A and Ky max. W/A is one of the two primary quantities we have already observed. The study of wing model characteristics as determined from laboratory tests shows a variation of Ky max. from 0.00273 to about 0.00420. More recent data from the Compressed Air Tunnel of the National Advisory Committee for Aeronautics indicate, however, that the 0.00273 increases to about 0.00311 and that the 0.00420 shrinks to about 0.00310, as the size of the test is increased, these values being approximate for thin and very thick wing sections. Flight tests on a full size airplane with thin wings gave a coefficient of 0.00346 including fuselage and tail surface lift. Therefore, it appeared as though the lift coefficient was approaching a common value of about 0.0032, as a conservative value for all wings of airplane sizes. This quantity was therefore assumed to be a constant. This left a definite relation between wing loading and landing speed, and the two quantities could be plotted along the same axis with two inter-related scales.

The next quantity of interest was the fastest speed at which the airplane could fly and maintain a level course. Here the progress of the chart stopped for considerable time. It was observed that in England a quantity known as "wing power loading" was being used to some extent. Here, as suggested by Mr. Montgomery Knight, was



Empirical chart for indicating the approximate performance of an average airplane. Below, an example of its use

Wing loading.....8 pounds per square foot
Power landing.....21 pounds per horsepower
High speed.....92 miles per hour (Project radially)

(Example:)

Landing speed.....50 miles per hour (Project horizontally)
Initial climb.....450 feet per minute (interpolate)
Absolute ceiling.....9,000 feet (interpolate)

a means of combining wing loading and power loading into one variable, i.e.,

$$\frac{W}{A} \Big/ \frac{W}{HP} = \frac{HP}{A}$$

A study of aerodynamic resistance showed that weight affected only the induced drag of an airplane and that at fast speeds this quantity was relatively small and could be safely neglected. Hence a plot was made from available data of airplanes, of the fast speed against wing and power loading. The plot was sufficiently well grouped to enable an average curve to be drawn. These values then could be plotted as radial lines on a chart of wing loading against power loading.

Cruising speed appeared to be a fictitious quantity defined arbitrarily as 80 per cent of the fastest speed. In practice, it was found to vary from the slowest to the fastest speed of the airplane according to engine roughness, head winds and pilot's impatience. Therefore, this quantity was reasonably neglected.

Lieut. Walter S. Diehl contributed an equation of absolute ceiling which solved the problem of maximum altitude. In rearranged form it is:

$$\frac{W}{A} = \frac{10{,}000}{\left(\frac{W}{HP}\right)^2 \text{ceiling}}$$

$$\frac{10}{.065K}$$

where K has an average value of 19,000

Assuming a series of constant altitudes and power loadings, the corresponding wing loadings were determined and the curves plotted. The limiting case of zero ceiling became indeterminate and a value of 10 was used in the calculation but the curve labelled zero on the chart.

Service ceiling is an arbitrary altitude where the rate of climb is 100 feet per minute. It might as well have been 95 or 110. It was believed that such a quantity should be neglected.

Rate of climb at the ground was the fourth and last quantity to be determined. A study of the relation between rate of climb and ceiling showed that perhaps some such relationship as

$$\text{Climb} = K \text{ ceiling}$$

might be used. K was found to vary from 0.030 to 0.090. No definite rule for this variation could be evolved, but it was noted that the majority of airplanes had a value of about 0.050 and that the extreme values were represented by but a few examples. Thus the altitude curves with the addition of another scale became also rate of climb curves.

Now we have the complete chart in its final form. It is derived mainly from empirical data and existing variations will always appear. It may, however, be used with correction constants or "booga factors" when the airplane performance is known and the effects of the variations in weight, wing area, horsepower, etc., are to be investigated. If the flight performance data are not available, it will give fair indications without any involved calculations.

For the man in the field it will serve as a quick check upon the claimed performance of airplane manufacturers. As pointed out by Prof. E. G. Reid, airplanes with wing loadings of the order of 15 pounds per square foot were claimed by their salesmen to land at speeds of 30 and 35 miles per hour! This is ridiculous, and yet the claims are made and often pass unchallenged. An examination such as Prof. Reid made of accurate Government tests bears out this fact. Other characteristics are likewise misrepresented to a lesser degree. This graph may perhaps tend to expose such claims.

Its value to designers may be best illustrated by examples. Assume W/A and W/HP, the four performance quantities may be determined by plotting the assumed variables as indicated on the chart by the point at W/A = 8 and W/HP = 21. The landing speed is found by reading horizontally to the right vertical scale. The high speed is found by a radial reading on the circular scale. The ceiling and rate of climb are found by interpolating between the hyperbolic type curves. The corresponding scales appear near the top of the chart. If the weight is varied, the point moves along the radial line because the ratio of W/A and W/HP remains constant. Thus the high speed is not changed, but the landing speed changes as do the rate of climb and the ceiling. The rate of climb will indicate the limit to which the airplane may be safely overloaded.

If it is desired to meet certain speed requirements, the point where the high speed radial line intersects the horizontal landing speed line gives the values of wing and power loading required. The climb and ceiling may also be read.

Should an airplane have an excessively large aspect ratio or spread, the following method may be employed with some degree of reliability. Determine the speeds with the actual area. Determine the climb and ceiling with a fictitious area caused by adding enough to the chord dimension to give an average aspect ratio. This will result in a fictitiously reduced wing loading and a correspondingly greater climb and ceiling.

The high speed of seaplanes will be about five per cent less than the corresponding high speed of landplanes.

A straight line which is determined by

$$W/A + W/HP = \text{constant}$$

is of interest. It extends diagonally across the chart at approximately constant climb and ceiling. Such a line may be taken to indicate approximately the maximum loadings to which an airplane may be subjected. Of every-day airplanes, the climb should never be less than 500 feet per minute; i.e., the constant equal to 28. For long range "stunt" flights a maximum loading limit of a constant equal to 41 gives zero climb. Thus a constant equal to say 40 will indicate the maximum load with which the airplane will safely fly.

Other methods of using the chart will undoubtedly appear with its use. It is hoped that it will be of value to the aeronautical public, not as an instrument of great accuracy and refinement, but as a quick scale with which to measure the elementary proportions of new airplanes as they are being laid out and indicate existing airplane performances.

NEW WESTINGHOUSE MICARTA PULLEYS

THE development of the large airplane and the refinement of the smaller craft has led to the development of a new micarta aircraft pulley, supplementing the present line of micarta products manufactured by the Westinghouse Electric and Manufacturing Company. The pulleys are equipped with high grade ball bearings with close fitting dust shields. They are packed with grease at the factory.

In mounting the bearing in the pulley, a brass bushing with its outer surface knurled is anchored in the pulley in the molding operation. The inner diameter of the bushing is then reamed accurately to size, the bearing pressed in place and the edges of the bushing finally swedged over to prevent the bearing from becoming loose. Advantages claimed for this construction are:

The bearing can be packed with grease before assembly of the dust shield, insuring permanent lubrication.

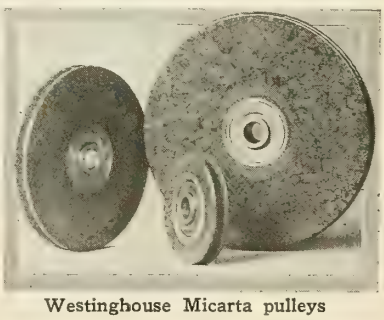
Accurate alignment of the bearing can be secured. This is insured by a machining operation and is not dependent on accuracy and condition of the molding equipment.

The pressed and swedged in bearing will remain tight under all normal temperature and moisture conditions.

The ball bearing is kept in its oiled paper carton until the pressing and swedging operation. Afterward, the completed pulley is immediately wrapped and packed for shipment.

In regard to the application of these pulleys, it is recommended that they be installed in protected positions. Direct exposure to dust from the propeller slipstream and mud from the landing gear is to be avoided. Corectly installed, the pulley will require no lubrication and will have long life.

In general, it may be stated that these pulleys will carry the maximum safe load for the recommended cable. This load will seldom exceed 300 pounds, except possibly in the case of brakes where momentary forces may be greater.



Westinghouse Micarta pulleys

DIGEST OF FOREIGN TECHNICAL ARTICLES RELATING TO AERONAUTICS

By Elsa Gardner

Cineclinograph

The Cineclinograph Estienne-du Cluzel (Le Cinéclinograph Estienne-du Cluzel) Aéronautique, Vol. 12, No. 130, March, 1930 (Aérotechnique Supplement), pp. 89-95, 19 figs.

COMPLETE details of the cineclinograph are given. This instrument registers photographically over the same diagram the speed of the airplane over its course, the slope of the path, the pressure and temperature of the air, the number of revolutions of the engine, and the time. All the recording instruments are located alone in a case protected from the light and inviolate. Towed by the airplane at a distance sufficiently below it, the device is placed following the relative motion with respect to the air.

The apparatus has the form of a streamlined body of revolution of the Andreau profile, being ellipsoidal in front and pointed in the rear. The body is prolonged at the back by a cross-shaped empennage which directs the axis of the instrument, following the relative wind, and reduces very rapidly the oscillations which may accidentally be communicated to it. The light, furnished by lamps, is divided into beams by mirrors and telescopes.

Size and Structural Weights

The Influence of Size on the Structural Weights of Aircraft, F. Duncanson, Flight, vol. 22, No. 13, March 28, 1930 (Aircraft Engineer Supplement), pp. 17-21, 7 figs.

BY MEANS of logical assumptions and simple integrations, it is shown how structural weights are affected by the size of aircraft, the cantilever monoplane wing being selected because its more easily calculated. The investigations conform to the fundamental laws governing the structural weights of aircraft wings of similar geometric proportions, and demonstrate the difficulty of obtaining economical aircraft structures in large sizes as long as the geometric proportions remain constant. It is found, however, that with each successive change in geometric proportions and general design (mostly rendered possible because of increase in size) the difficulty is considerably lessened. Wing-weight percentages for several large airplanes are given.

The landplane is at a natural disadvantage, as wheel weights increase according to load, while hull structural weight percentage actually decreases with increase of size. It is concluded that it is difficult to predict a limit of size for aircraft, since the element of fineness enters so largely in design; in the case of flying boats no definite limit of size is yet in sight.

Reference is made to an article by Dr. Rohrbach, published in the October, 1929, issue of AERO DIGEST.

Crankshaft Vibration

New Results in the Field of Crankshaft Vibration (Neuere Ergebnisse auf dem Gebiet der Kurbelwellenschwingungen), A. Stieglitz. "Luftfahrtforschung," Vol. 6, No. 4, Feb. 14, 1930, pp. 103-109 and (discussion) pp. 109-110, 17 figs.

THE rotation vibration fracture of the crankshaft is examined in the position of the fracture and is explained by the overburden of the working load and vibration stress. Starting with a consideration of energy, the influence of the agitating force and damping is investigated. The specific agitating force is found which is simply determined on the graph and from which the critical velocity is deducted. The influence of the order of firing is shown and a favorable firing order is found for a six-cylinder engine. Results are confirmed by vibration measurements. The action of the damper is examined and its most favorable adjustment determined. Power resonance curves taken on engines with and without dampers are represented. In conclusion the measuring technique is discussed briefly.

Wheel and Tire Design

Wheels and Tyres, G. H. Dowty. "Flight," Vol. 22, No. 1113, April 28, ("Aircraft Engineer Supplement) pp. 28-32, 9 figs.

MECHANICAL and aerodynamic properties of wheels and tires are discussed and the results of recent tests are outlined. From these investigations it is proved that the use of non-skid or safety-pattern tread does not seriously increase wheel resistance. Oversized tires should be employed only in conjunction with tire fairings. For standard wheels and tires, squarely mounted, the provision of rim to hub fairings is quite efficient, and little improvement can be gained by the use of tread fairings. Toe-in or out of wheels should be carefully avoided.

The shock absorbing capacity of pneumatic tires is examined in the light of some recent investigations. Tests made by B. F. Goodrich Rubber Co. indicate that the tire does not absorb any energy in the vertical direction. Whereas the static test shows charcteristics in the hysteresis loop, in the dynamic test the loading and unloading curves coincide.

Aerodynamics

On the Resistance Experienced by a Cylinder Moving in a Channel of Finite Breadth, Susumu Tomotika. Tokio Imperial University, Aeronautical Research Institute—Report No. 58, Vol. 5, No. 5, March 1930, pp. 101-140, 5 figs.

THE general expression for the resistance experienced by a cylinder moving in an incompressible ideal fluid in a channel of finite breadth is obtained by applying both Kármán's and Synge's methods of calculation, assuming that in the distant wake of the cylinder there exists a stable vortex street of the unsymmetric type.

It is concluded that the case of Kármán vortex street in an unlimited fluid may be taken as the limiting case of a vortex street in a channel of finite breadth, and that the well-known Kármán resistance formula can be obtained, contrary to Villat's result, as the limiting case from the general resistance formula of a cylinder in the channel by removing the walls of the channel to infinity.

Considerations of Lift (Considerazioni sulla portanza), U. de Caria "Aeronautica," Vol. 4, No. 4, April, 1930, pp. 257-260, 7 figs.

THE aerodynamic forces acting on a wing are analyzed, and equations are developed using the elliptical distribution of lift from Prandtl's theory. It is proved that the area of the section of the ideal fluid vein having been affected by a wing possessing elliptical distribution of lift is equal to that of a circle having for a diameter the span of the wing. The angle of deviation of the fluid vein is equal to twice the angle of the induced incidence. The average reduction of the velocity that the ideal fluid mass undergoes on one of the wings of the elongation six, is of the order of two per thousand. The angle of deviation and the coefficient of the induced drag are inversely proportional to the fluid mass affected in a unit of time.

The influence of the geometric characteristic on the aerodynamic characteristic of the wing is shown. The application of these developments to the biplane is given, and the oscillations of the center of pressure are explained.

Aluminum Alloys

The Recent Progress of Light Aluminum Alloys (Les récents progress des alliages legers d'aluminum), L. Guillet. "Genie Civil," Vol. 96, Nos. 18, 19, and 20, May 3, 10, and 17, 1930, pp. 427-431, 449-454, and pp. 475-478, 16 figs.

THE discovery and properties of durlumin, and the properties and heat treatment of aluminum-silicon, aluminum-silicon-magnesium, aluminum-copper, aluminum-copper-silicon, aluminum-copper-silicon-magnesium (with and without nickel, zinc or manganese), and of alloys including cadmium, titane and zinc, are described. The progress of aluminum alloys in the construction of automobiles and airplanes is noted.

It is shown that the method of casting duralumin, the speed of cooling, the dimensions of the part, the duration of heating before tempering, and the temperature of quenching have a remarkable influence on the final result. But the cast alloy is more brittle than the forged or drawn alloy. The influence of cadmium in reducing corrosion is referred to and the reduction of friction of pistons by the use of a heat-treated aluminum-copper alloy is pointed out. Remarkable results were obtained with a copper alloy containing three per cent beryllium. It possessed a breaking stress of 21 to 22 kg. per sq. mm. and gave a breaking stress of 150 kg. per sq. mm. after hardening and tempering.

Engine Lubrication

The Lubrication of Engines, O. Thornycroft and C. H. Barton. "Aircraft Engineer," Vol. 2, Nos. 12 and 15, February and May, 1930, pp. 36-39 and pp. 109-113, 7 figs., 14 tables.

THE influence of various physical and chemical characteristics of lubricants upon engine lubrication is determined in the first article, and a single-cylinder test unit, developed by Ricardo and Co. for varying the experimental conditions while compar-

(*Continued on page* 122)

EAC-1 FOLDING-WING MONOPLANE

THE EAC-1 is a two-seater side-by-side, open-cockpit, parasol monoplane produced by the Engineers Aircraft Corp. of Stamford, Conn. With pilot and passenger, 50 pounds of baggage, fuel and oil for a 450-mile cruise, it weighs 1,400 pounds. The ship is 20 feet long and has a span of 30 feet. It has folding wings.

The wing structure is rigidly braced with steel tubes. Every fourth rib is of chrome-molybdenum steel, and every steel member is protected internally against corrosion by a film of oil forced through small holes, which are later sealed.

The rudder pedals are adjustable. The instrument board is recessed to facilitate the reaccommodation of sight after looking earthward during flight. There is a shelf before the instrument board on which to put things. The cushion can be replaced with a parachute which is exactly the same size.

The internal structure of the control surfaces consists of chrome-molybdenum steel and Hyb-lum, a non-corrosive aluminum alloy. The elevator and rudder are operated by a push-pull system, and the ailerons are designed to prevent wing flutter. All moving parts are mounted on bronze or ball bearings. A "Bungee" installation allows adjustment of the stabilizer in flight. Sliding the handle up or down makes the adjustment, and either occupant may do it.

The fuselage is a rigid structure of welded chrome-molybdenum steel tubes. Like the rest of the ship, it is analyzed for a load factor of ten, which is in excess of the requirements of the Department of Commerce. Two Airwheels mounted on rigid tripods take landing shocks.

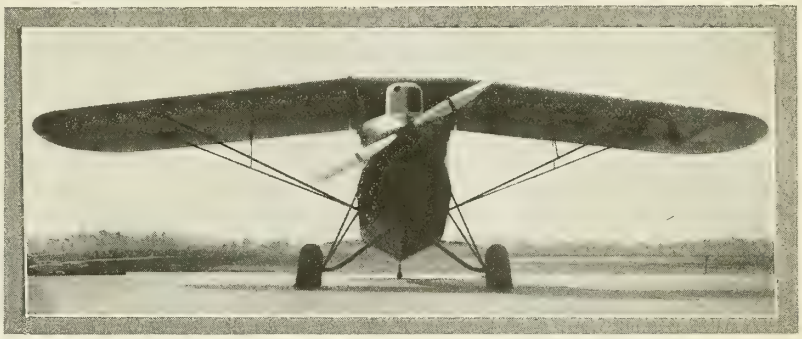
The engine is a Wright Gipsy, which develops from 90 to 100 horsepower. Cooling is provided through jet louvres. The exhaust pipe is independently cooled. Fire hazard is reduced by a firewall and sheathing of the exhaust pipe. Oil cannot collect at the bottom of the cowling, since ample sized holes allow it to drain off. The fuel is fed either by gravity, engine pump or hand pump. Two strainers insure proper cleansing of the fuel before it enters the carburetor.

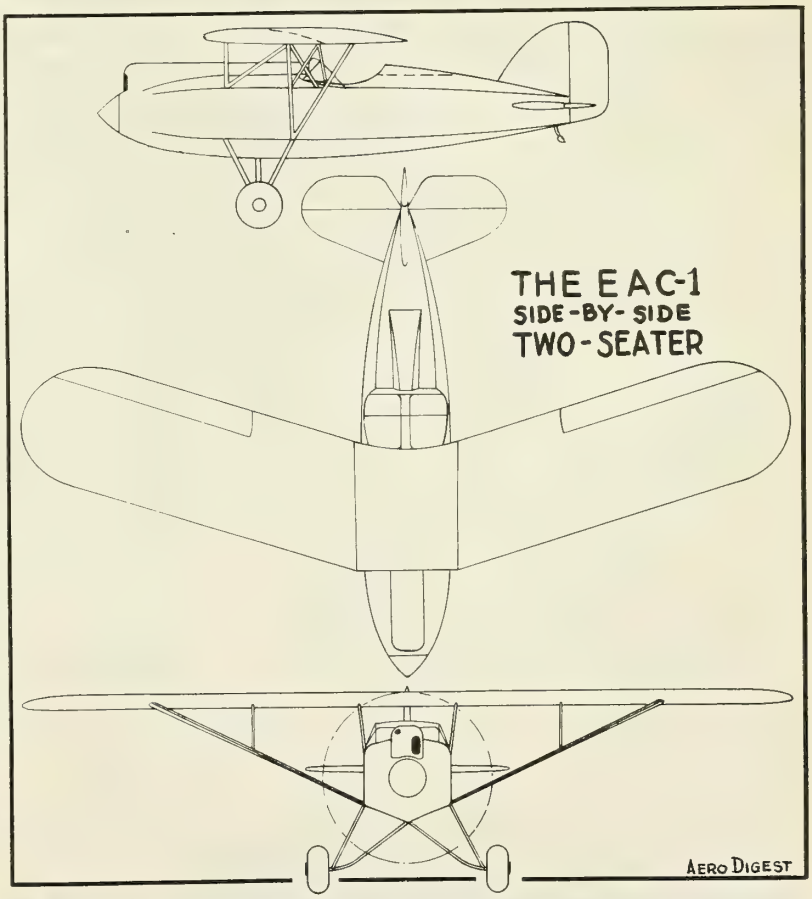
Specifications

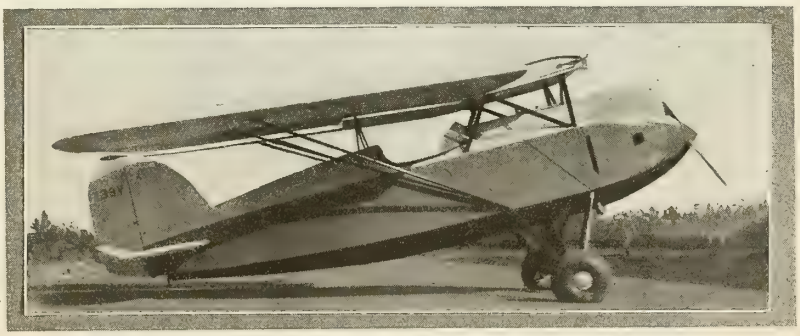
Span	30 feet
Length	20 feet
Dimensions, wings folded	20 by 11 feet
Weight fully loaded	1,480 pounds
Weight empty	925 pounds
Weight of gas	144 pounds
Weight of baggage	50 pounds

Performance (Full Load)

High speed (sea level)	120 mi. per hr.
Cruising speed (sea level)	100 mi. per hr.
Landing speed	45 mi. per hr.
Absolute ceiling	15,000 feet
Service ceiling	12,500 feet
Rate of climb (sea level)	800 ft. per min.
Range at cruising speed	450 miles
Endurance at full throttle	3 hours







Views and outline drawings of the EAC-1 parasol monoplane

DIGEST OF FOREIGN ARTICLES

(*Continued from page* 120)

ing different oils for sludging tendencies, is described.

It is found that the property of "oiliness" is not of importance in oils intended for the lubrication of aircraft engines. Viscosity is important at two temperature ranges, relating to supply of lubricant to bearings at lowest temperatures of oil-circulation system, and to rate of oil consumption.

Sludging tendencies of an oil depend on its source and on refining received. Carbonization is chiefly due to incomplete evaporation and combustion of lubricating oil in the cylinders. Cylinders of four-stroke air-cooled gasoline engines working at very high temperatures can be satisfactorily lubricated by mineral oil distillates without the addition of Bright Stocks or fatty oils.

Aircraft Noise Analysis

The Analysis of the Sounds Emitted by Aircraft, Jûichi Obata and Yahei Yosida. Tokio Imperial University, Aeronautical Research Institute —Report No. 59, Vol. 5, No. 6, March, 1930, pp. 143-185, 29 figs. on supp. plates.

SOUNDS recorded from a bomber, a chaser, a reconnaissance plane and a small dirigible are discussed. The recording arrangement consisted of a band-microphone, seven-stage resistance-capacity-coupled amplifier and oscillograph.

Besides recording sounds made by an airplane in flight, experiments were carried out on an airplane on the ground with special reference to the directivity of the sound and to the influence of the number of revolutions on the nature of the sound. At long distances the greater part of the sound originated from the propeller, consisting of fundamentals and second harmonics, while at a short distance the exhaust sound predominated. Different airplanes equipped with the same engine gave different records of sound. It was found in calculating the pitch of the fundamental of exhaust sound that it was best to use the number of cylinders per bank instead of the total number.

Improving Vision from Airplanes

Possible Improvements of Vision from the Present Standard Airplane (Améliorations possibles des vues de l'avion classique actuel), J. Biche, R. J. de Marolles, P. Léglise, H. Bouche. "Aéronautique," Vol. 12, No. 131, April, 1930, pp. 117-126, and (editorial) pp. 115-116, 34 figs.

THIS article is a composite one containing the suggestions of different authors for providing better vision for the pilot. The advantages of vision afforded in planes built before and during the war are pointed out, and present designs criticized. The effect of different arrangements of wing on the vision of the pilot in landing, take-off, acrobatics or taxying on the ground is explained.

Mr. Biche offers three designs of low-wing monoplanes from which the maximum vision may be obtained. The cabin or cockpit is located far forward ahead of the engines and landing gear. The trimotor plane has two driving and one pusher propeller and six Goodyear Airwheels in the landing gear. Mr. Léglise presents an interesting method for determining the "coefficient of vision from an airplane."

Cantilever Wing Design

Points on the Calculation of Cantilever Wings (Appunti sul calcolo dell' ala a sbalzo), G. A. R. Verdusio. "Aerotecnica," Vol. 10, No. 4, April, 1930, pp. 239-261, 4 figs.

THE conditions for equilibrium in a cantilever airplane wing are examined. A short discussion is given concerning the methods of calculation and their accuracy. The agreement of the calculation with approximate equations which are nearly equal but more simple is shown, and their use explained in detail.

Concerning the Cantilever Wing with Two Spars (Sull'ala a sbalzo a due longaroni), C. Minelli. "Notiziario Tecnico di Aeronautica," Vol. 6. No. 4, April, 1930, pp. 15-21, 4 figs.

FORCES acting on a cantilever airplane wing are analyzed. The rigidity of the wing to bending and torsion is variable along the axes according to related laws. The wing ribs have infinite rigidity in their own plane but have finite rigidity outside of it.

After short and clear definitions, it is demonstrated how the following property may be used: along an axis parallel and symmetrical to the elastic axis the bending moment is annuled in all the ribs.

Concerning the Ideal Weight of Cantilever Wings (Ancora sul peso ideale della ali a sbalzo), G. Gabrielli. "Aerotecnica," Vol. 10, No. 4, April, 1930, pp. 262-275, 6 figs, 4 tables.

IN a continuation of a preceding study on the subject, the author seeks the ideal weight of a set of cantilever wings having the same span and chord with different lengths at the roots. The conclusion is reached that, for the same types of wing, the rectangular one is heavier, and therefore the stability extended through the reduction in weight makes it necessary to adopt very tapered wings.

Airship Mooring Indicator

Airship Mooring-Strain Indicator, "Engineering," Vol. 129, No. 3355, May 2, 1930, pp. 584-585.

INSTRUMENTS employed in measuring the horizontal and vertical forces to which the R-101 airship was exposed when moored to the mast at Cardington are explained. The forces are transmitted through a steel mooring tube, the bending of which is a measure of their magnitude. To measure the bending, two electrical strain gauges are mounted on an outer tube which is coaxial with the mooring tube but it not exposed to stress. One measures the vertical forces due to excess or deficiency in buoyancy, while the other shows the magnitude of the horizontal forces due to wind.

Designing Racing Seaplanes

Racing Seaplanes, F. Holroyd. "Royal Aeronautical Society—Journal," Vol. 34, No. 233, May, 1930, pp. 423-435, and (discussion) pp. 436-437, 8 figs.

AIRPLANE and engine problems to be faced in designing for speed are outlined by the Assistant Chief Engineer of the Supermarine Aviation Works, builders of the S-6 1929 Schneider Trophy winner. The development of smooth surface radiators transmitting air loads to the wing spars has materially helped in the reduction of weight and drag of the S-6 seaplane.

Interference due to attachment of struts and wires to the fuselage, wing and floats accounts for some 16 per cent of the total machine resistance. Flush riveting is used to keep skin friction to a minimum. The fin of stainless steel is built into the fuselage and forms the oil tank which is virtually an oil cooler. Twin-float tanks complicate the fuel systems somewhat, but have compensation in that they help balance the engine torque loads.

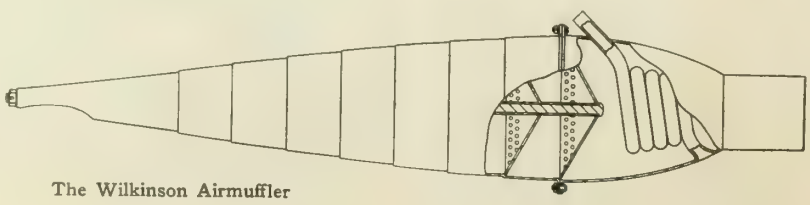
THE WILKINSON AIRMUFFLER

THE outer shell of the Wilkinson Airmuffler consists of two parts of somewhat conical shape joined together base to base, the rear part being considerably longer than the front part. The baffle plates consist of a series of cones of diminishing sizes pointing towards the intake and perforated around their outer edges to keep the flow of gas as near to the shell as possible. Small concentric ridges are formed in the shell constituting bearing surfaces for the edges of the baffle plates, the latter being secured in position by spot-welding in the smaller models. In the larger models the baffle plates are secured to a strengthening rod passing through their centers and are held against the ridges in the shell by means of a nut threaded on the end of the strengthening rod which passes through the end of the muffler. The two parts of the shell are welded together in the smaller models, and bolted together by grooved flanges in the larger models. The rear end of the muffler has an opening in one side to deflect the exhaust gases away from the body of the airplane on which it is used.

Provision is made for heating the cabin of the airplane with hot air from a coil of tubing in the front part of the muffler. A valve on the outlet of the coil regulates the amount of heat transmitted to the cabin.

The gases are diverted through the baffle plates with minimum turbulence; there are no surfaces at right angles to the flow of gas, and there is no reversal in its direction. The muffler will be made in several standard sizes, including a small individual model to be attached directly to each cylinder.

The inventor is Paul H. Wilkinson of Los Angeles, California.



The Wilkinson Airmuffler



SPEED. . .

with a new sense of security

SPEED has frequently been bought at too great a cost, not so much in dollars and cents, as in the sacrifice of other vital characteristics. To gain greater speed in designing an airplane it is easy to lose efficiency—and safety.

The greatest merit of Bellanca design is that the efficiency of the airplane and the safety of its passengers *have never been sacrificed for speed.*

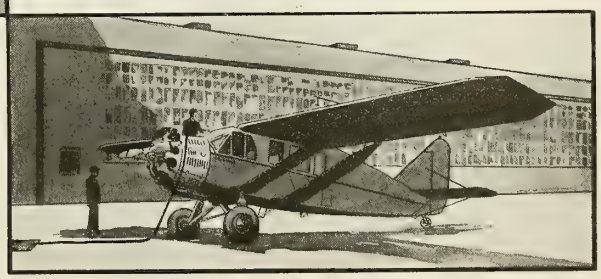
Yet the Bellanca *Pacemaker* has been victorious in practically every speed race in which it has been entered. It will carry you (with a pilot and four guests) at 145 miles an hour—reliably, steadily, safely! With the throttle open only two-thirds, this sturdy cabin plane speeds along with great reserve power, flying stability and economy, at 122 miles an hour. With a somewhat larger engine, the Bellanca *Skyrocket* (same type of plane) travels at 150 miles an hour.

Superior speed, combined with a high rate of proved efficiency and safety, is the formula of Bellanca design and construction. "Built as only Bellanca can build" means that the finest materials obtainable have been manufactured under the personal guidance of leading engineers to produce an airplane of famous quality. People whose experience has taught them that only in excellent engineering can they hope to find excellent airplane building, buy the Bellanca with every sense of genuine security.

The Bellanca Pacemaker is a six-place cabin monoplane with 300 h.p. engine, finished in finest automobile coachwork. High speed, 145 m.p.h. Payload with pilot, 1,235 lbs. U. S. Dept. of Commerce Approved Type Certificate No. 129. *The Bellanca Skyrocket,* of similar specification, is powered with the 420 h.p. Wasp engine. High speed, 150 m.p.h. U. S. Dept. of Commerce Approved Type Certificate No. 319. Both types are readily convertible into excellent seaplanes. *The Bellanca Airbus* is a 12 to 14 place single-engined monoplane, particulars of which will be sent on request to any commercial operator.

BELLANCA AIRCRAFT CORPORATION
NEW CASTLE, DELAWARE

Canadian Distributors: Bellanca Aircraft of Canada, Ltd., Montreal



BELLANCA

THE BUMSTEAD SUN COMPASS

THE Sun Compass, which is the invention of Mr. A. H. Bumstead of the National Geographic Society, furnishes true or geographic directions as distinguished from magnetic directions which are read from a magnetic or from an earth inductor compass.

The Sun Compass was originally perfected for the use of Admiral Byrd on his flight from Spitzbergen to the North Pole and return. It was also an important unit of the navigation equipment of the Byrd Antarctic Expedition and played a vital part in the navigation of the flight of the Ford trimotor *Floyd Bennett* from Little America to the South Pole and return. Sun Compasses are also used by the United States Navy and by exploratory expeditions in Northern Canada. Professor Hobbs of the University of Michigan used a Sun Compass in his explorations in the wilds of Greenland.

The Sun Compasses used by Commander Byrd in the Antarctic differed from those which he used at the North Pole in that the design was reversed for use in the Southern Hemisphere. To an aviator over the North Pole, the earth rotates in a counter-clockwise direction, whereas to an aviator over the South Pole, the earth appears to rotate clockwise. For this reason, a Sun Compass must be built for use either in the Northern or Southern hemisphere, since one instrument is exactly the reverse of the other.

The Sun Compass furnishes true or geographic directions. The indications of this instrument are related to the position of the sun and they are, therefore, entirely reliable, if the setting of the instrument has been properly made.

The primary use of the instrument is as a substitute for the magnetic compass in those regions where magnetic compasses are unreliable either because of the weakness of the horizontal component of the earth's magnetic field or where the amount of magnetic variation is unknown. In combination with a good magnetic compass, the Sun Compass will permit determination of the magnetic variation, should this be unknown.

Finally, the Sun Compass can be of great assistance in compensating magnetic compasses, in which case, the true headings obtained from the Sun Compass must be first changed to magnetic headings by adding or subtracting the variation before comparing them to the headings indicated by the magnetic compass.

The instrument consists essentially of a time piece with a single pointer which revolves once in 24 hours. The pointer is equipped with a shadow pin and a translucent screen on which the shadow of the pin can be made to fall.

It is clear that since the sun apparently rotates around the earth once in 24 hours, if the instrument is so directed as to have the shadow of the pin fall on the screen, the shadow will stay in the same position on the screen so long as the sun is visible, since the pointer revolves at the same rate of speed as the sun.

This means that if, when the shadow of the pin fell on the screen, the base plate of the instrument was in a certain position, and if we should move the instrument around, the old position of the base plate could always be found by causing the shadow of the pin to fall again on the screen.

In order to render the instrument capable of being set to obtain given directions, the time piece is carried by two brackets mounted on a horizontal disc graduated from 0 to 360 degrees. This disc is rotable on a pivot and the graduation can be read against an index mounted permanently on the base plate of the instrument.



Courtesy of Pioneer Instrument Co.

The Sun Compass originally developed for Rear Admiral Byrd

The readings obtained are true only when the following conditions are satisfied:

1. The base plate of the instrument, and graduated disc thereon must be horizontal. A bubble level is provided which is mounted on the base plate and permits leveling of the instrument.

2. The axis of rotation of the pointer must be parallel to the axis of rotation of the earth. To do this, the time piece can be tilted, and the amount of tilting read from the graduated sector marked "Latitude." The time piece is tilted to correspond to the latitude of the observer.

3. The pointer of the time piece must be set to local apparent time as indicated on the dial. Local apparent time is true Solar time, taking into account the Longitude of the observer and the Equation of Time.

For civil uses, Standard Time has been selected. The earth has been divided into 24 wedges, the extreme meridians of which are 15 degrees of Longitude apart.

Standard Time in the areas thus defined, starting from the Meridian of Greenwich which occupies the center of the first wedge, differs by exactly one hour from the adjacent one. Countries which lie within one of these wedges or which exceed its boundaries but by a small amount carry the civil time assigned to the wedge. For instance, in Europe: England, France, Portugal and Spain are all regulated on Greenwich Time. In the United States of America which occupies a very large area extending over four wedges, four different times have been adopted; namely, Eastern, Central, Mountain and Pacific. These are, respectively, the time of the 75th meridian (Eastern Standard), which is five hours earlier than Greenwich, that of the 90th meridian (Central Standard), which is six hours earlier than Greenwich and one hour earlier than Eastern Standard, that of the 105th meridian, (Mountain Time) seven hours earlier than Greenwich, two hours earlier than Eastern Standard and one hour earlier than Central Standard, and the time of the 120th meridian (Pacific Time) which is one hour earlier than Mountain Time.

Clocks are regulated on these various times and in order to obtain the time on which to set the Sun Compass a correction for longitude must be made.

The change in time is four minutes for each degree of longitude. For instance, if from a clock reading Eastern Standard Time we want to find the time for Longitude of a point lying on the 81st meridian of Westerly longitude, the correction is minus 24 minutes because—

Eastern Standard Time .....75 degrees W
Longitude .....80 degrees W

Difference ..... 6 degrees W
6×4 minutes $= 24$ minutes

This first operation converts the Stand-

ard Time to Local Civil Time, but a second correction is required in order to convert Local Civil Time to Local Apparent Time.

This second correction, which may run as high as 16 minutes to be added or subtracted according to the season of the year, can be obtained from a diagram, which represents the "Equation of Time." It shows clearly whether the corrections should be added or subtracted.

The two wing nuts on the trunnions of the time piece must be loosened and the time piece tilted to the proper inclination corresponding to the mean latitude of the course to be flown. This element is set on the latitude arc provided for the purpose, and the wing nuts tightened.

The time piece must be wound and set to local apparent time. This is obtained by reducing standard time to local civil time (correcting for difference in longitude) and then adding or subtracting the Equation of Time to be obtained from the analemma furnished with the instrument. This diagram, roughly resembling the figure 8, gives by direct reading the number of whole minutes to be added or subtracted from local civil time to convert this to local apparent time.

The course to be flown is then set by loosening the thumb nut on center of compass rose, and rotating the instrument to place the desired direction in correspondence with the index. The thumb nut is then tightened and the compass is ready for use.

To fly the true course as set, the airplane must be so oriented as to have the shadow of the pin on the time piece pointer fall between the two black vertical lines on screen.

Example: Oct. 15th; Long. 80 degrees W Lat. 40 degrees N. at 9:30 a. m. E. S. Time
Course to be flown 321 degrees true.
E.S.T. (75th Meridian), $9^h\ 30^m$ a.m.
Diff. Long. 5 degrees
West, or
Diff Time 20^m minus. 20^m

Local Civil Time..... $9^h\ 10^m$ a.m.
Equation of Time.... 14^m
(apparent time fast)

Local Apparent Time. $9^h\ 24^m$ a.m.

The time piece must be set at 9:24 a. m. and tilted to read 40 degrees on latitude sector. The compass rose is set for 321 degrees.

The airplane is now turned to have shadow of pin fall between the two black lines on the screen and flown in such direction corresponding to a true heading of 321 degrees.

BUZZARD LIGHT PLANE

MOTOR GLIDERS, INC., Dayton, Ohio, has completed initial flight tests of the "Buzzard," which is a light airplane of the type sometimes referred to as motored gliders. In the tests, which were conducted at Johnson Airport, Dayton, this ship reached an altitude of 10,000 feet, obtained a speed of approximately 75 miles per hour and a landing speed of 28 miles per hour. The landing run was 50 feet.

The Buzzard is powered with a two-cylinder, air-cooled, opposed A. B. C. Scorpion engine driving a wood propeller. The engine is installed at the rear of the wing and is of the pusher type, developing 34 horsepower at 2,300 revolutions per minute and weighing 112 pounds. This power plant is equipped with a Duplex carburetor, double magneto and has two spark plugs to each cylinder. The fuel consumption is two gallons an hour at cruising speed, using ordinary automobile gasoline.

The wings and the fuselage of the machine are covered with fabric, with the exception of the bottom of the fuselage, which is duralumin over plywood. The leading edges of the wing are covered with plywood. The wings are externally braced with struts, and the wing spars are seven inches thick and rounded at the ends. The landing gear is the split-axle type with oleo shock absorbers and is built into the fuselage.

Specifications

Span	35 feet
Height overall	6 feet
Chord	5 feet
Weight empty	460 pounds
Payload	340 pounds
Take-off distance	100 feet
Ceiling	10,000 feet
Length	19 feet 3 inches
Wing area (incl. ailerons)	175 square feet
Rudder area	17 square feet
Elevator area	24 square feet
High speed	70 miles per hour
Cruising speed	60 miles per hour
Stalling speed	35 miles per hour
Climb with full load	600 feet per minute
Take-off run	95 feet

NAPIER V11D RACING ENGINE

THE Air Ministry of Great Britain recently released the specifications and description of the Napier V11D racing engine, manufactured by D. Napier and Son, Ltd., of London, England. This engine has twelve cylinders arranged on three blocks of four each, one vertical and two at sixty degrees, and the direction of rotation of the propeller shaft is anti-clockwise viewed from the propeller end. The Napier V11D develops 1,275 horsepower at 3,600 revolutions per minute, and weighs 1,130 pounds including the airscrew boss. This engine powered the plane in which Flight-Lieut. Stainforth established a world's speed record for one kilometer of over 336 miles per hour.

Specifications

Bore	5.5 inches
Stroke	5⅞ inches
Weight per horsepower	.889 pounds
Length overall	64 13/16 inches

THE BIBLIOGRAPHY OF AERONAUTICS, 1928

Published by the N.A.C.A.

THE N.A.C.A. Bibliography of Aeronautics for 1928 covers the aeronautical literature published from January 1 to December 31, 1928. The first Bibliography of Aeronuatics was published by the Smithsonian Institution as Volume 55 of the Smithsonian Miscellaneous Collections and covered the material published prior to June 30, 1909. Supplementary volumes of the Bibliography of Aeronautics, for the subsequent years have been published by the National Advisory Committee for Aeronautics. They are the Bibliography of Aeronautics for the years 1909-1916, 1917-1919, 1920-1921, 1922, 1923, 1924, 1925, 1926, and 1927.

As in previous volumes, citations of the publications of all nations are included in the language in which these publications originally appeared. The arrangement is in dictionary form with author and subject entry, and one alphabetical arrangement. Detail in the matter of subject reference has been omitted because of the cost of presentation, but an attempt has been made to give sufficient cross reference for research in special lines.

The Bibliography of Aeronautics for 1928 contains 214 pages, and may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at fifty cents per copy.



The 34-horsepower two-seater Buzzard light airplane in flight near Dayton, Ohio

RECENT AIRCRAFT PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C., at the rate of twenty cents each. State number of patent and name of inventor when ordering.

Aeroplane. Alex Serna, Fordson, Mich. (No. 1,754,910).

Instrument-panel for aircraft. Carl E. Johnson, Seattle, Wash.; assignor to Boeing Airplane Company, Seattle. (No. 1,754,954).

Vertical-rising airplane. Axel G. Bergman, New York, N. Y. (No. 1,754,977).

Aeroplane. Gustav Ploger, Dell, Mont. (No. 1,755,022).

Sustaining and stabilizing attachment for airplanes. Harry P. Finley, Little Rock, Ark. (No. 1,755,058).

Airplane control stick. Otto H. Madorie, Marshall, Mo. (No. 1,755,124).

Fuselage for aeroplanes. Walter K. Dwelle, Houston, Tex. (No. 1,755,211).

Aerial mail exchange. Lucy C. Ashley and William B. Bahn, Oklahoma City, Okla. (No. 1,755,235).

Lifting attachment for aeroplane-wings. Henri G. Tissot, West Oakland, Calif. (No. 1,755,342).

Aerial flare. George J. J. Clark, Whitman, and Ernest B. Jones, South Weymouth, Mass.; assignors to National Fireworks, Inc., West Hanover, Mass. (No. 1,755,388).

Aerial flare. George J. J. Clark, Whitman, and Ernest B. Jones, South Weymouth, Mass.; assignors to National Fireworks, Inc., West Hanover, Mass. (No. 1,755,389).

Parachute-rack. Floyd Smith, San Diego, Calif.; assignor to Switlik Manufacturing Company, Trenton, N. J. (No. 1,755,414).

Controllable auxiliary wing for airplanes. Charles H. Gunn, San Francisco, Claif. (No. 1,755,540).

Aeroplane. Otto von Kories, Holtville, Calif. (No. 1,755,828).

Aeroplane-wing. Joseph F. McKenzie, Abilene, Tex. (No. 1,755,886).

Aeroplane-control mechanism. Victor V. Muzik, Chicago, Ill. (No. 1,755,889).

Safety aeroplane-control stick. Joe B. Lievre, San Antonio, Tex. (No. 1,755,928).

Aircraft-pontoon. James A. Pendergrass, Franklin Furnace, Ohio. (No. 1,755,932).

Fuel-pump. Carroll R. Alden, Detroit, Mich.; assignor to Ex-Cell-O-Aircraft & Tool Corporation, Detroit. (No. 1,756,145).

Landing-gear for aeroplanes. Henry H. Phillips, Judith Gap, Mont. (No. 1,756,209).

Airplane. George E. Armington, Wickliffe, and Robert G. Nightingale, Cleveland, Ohio; assignors to Glenn L. Martin Co., Cleveland. (No. 1,756,272).

Aerofoil. Knneth N. Pearson, Netheravon Shepperton, England. (No, 1,756,300).

Aeroplane-boat. Estafiy Temens, Elizabeth, N. J. (No. 1,756,442).

Combined automobile and aeroplane. Anton Jezek, Hopkins, Minn. (No. 1,756,463).

Aeroplane. LeRoy D. Moss, Beloit, Kans. (No. 1,756,469).

Grease-feeder. William L. Morris, Chicago, Ill.; assignor to Bendix Aviation Corporation, New York, N. Y. (No. 1,756,657).

Aeroplane-landing means. Lionel Holland, Calcutta, British India. (No. 1,756,747).

Gyroscopic pilot for aeroplanes. Lawrence B. Sperry, Brooklyn, N. Y.; assignor to Spery Gyroscope Company, Brooklyn. (No. 1,757,096).

Aeroplane. Charles J. Boyd, Amarillo, Tex. (No. 1,757,109).

Protective device for balloons. Alfred Crossley, Washington, D. C.; assignor to Federal Telegraph Company. (No. 1,757,111).

Aeroplane. Wius Lamb, Blair, Okla. (No. 1,757,202).

Parachute. Edward L. Hoffman, Dayton, Ohio. (No. 1,757,247).

Air-controller for aeroplanes. Peter Lefevre, Detroit, Mich. (No. 1,757,435).

Air-intake heater. Lloyd Stearman, Wichita, Kans.; assignor to Stearman Aircraft Company, Wichita. (No. 1,757,488).

Airplane construction. Carl G. Thompson, St. Louis, Mo. (No. 1,757,603).

Sustaining attachment for airplanes. Gustaf Halldin, Indiana, Pa. (No. 1,757,630).

Wheel attachment for seaplanes. Frank N. Silva, Jr., Santa Maria, Cal. (No. 1,757,687).

Ship with aeroplane deck. Wilhelm Hefti, Winterthur, Switzerland. (No. 1,757,770).

Cowl construction. Carl Schlesinger, Arlington, N. J.; assignor to Pollak Manufacturing Company, Arlington, N. J. (No. 1,757,783).

Safety aeroplane. Joseph Leopold, New York, N. Y. (No. 1,757,842).

Parachute. Charles H. Castagne, Chicago, Ill. (No. 1,757,854).

Apparatus for determining the course of aircraft. Karl Petschenig, Vienna, Austria. (No. 1,757,874).

Aeroplane. John T. Rydberg, Harrison, N. J. (No. 1,757,879).

Aircraft. Charles J. Mulzer, Evanston, Ind. (No. 1,757,918).

Tensiometer. Wolfgang B. Klemperer, Akron, Ohio; assignor to Goodyear-Zeppelin Corporation, Akron, Ohio. (No. 1,757,933).

Flying-machine. Francisco I. de Christo, Horta Azores. (No. 1,758,031)

Airship. George A. Eagles, Chesham, England. (No. 1,758.076)

Rigid airship. Charles D. Burney, Barnes N. Wallis, and John E. Temple, Westminster, London, England; assignors to Airship Guarantee Company, Ltd., London. (No. 1,758,143)

Parachute-container. Harry E. Parker, Sr., San Diego, Calif. (No. 1,758,170)

Aeroplane. Nassif E. Shibly, Wheeling, W. Va. (No. 1,758,204)

Airplane-wing. William F. Cottrell and Joseph McAuliffe, Denver, Colo. (No 1,758,355)

Aeroplane-wing structure. Julius S. Fox, Cleveland. (No. 1,758,360)

Aircraft. Bror M. Schauman, Highlands, N. J.; assignor to Thord-Gray Holding Corporation, New York, N. Y. (No. 1,758,377).

Airplane. Vincent J. Burnelli, Lincol. Neb.; assignor to R. B. Patent Corporation, New York, N. Y. (No. 1,758,498)

Flying-machine. Peter McG. Bruce, Lochhill, Scotland. (No. 1,758,556)

Aircraft-propeller. Gail G. Currie, Los Angeles, Calif. (No. 1,758,560)

Auxiliary piloting device. Raoul Bernady, Neuilly-sur-Seine, France. (No. 1,758,592)

Parachute-rip-cord construction. Leslie L. Irvin, Buffalo, N. Y.; assignor to Irving Airchute Co., Buffalo. (No. 1,758,795)

Tandem-motored monoseaplane. Heil V. Sweet, Buffalo, N. Y. (No. 1,758,866)

Parachute-rip-cord. George Waite, Buffalo, N. Y.; assignor to Irving Airchute Co., Buffalo. (No. 1,758,871)

Retarding device for aircraft. Lytle S. Adams, Seattle, Wash.; assignor to Airways Patent Corporation. (No. 1,758,880)

Aircraft signal. John P. Buckley, Washington, D. C., and Arthur E. Nesbitt, Chevy Chase, Md. (No. 1,758,927)

Airplane. Frank Bauer, Williamsville, N. Y. (No. 1,759,032)

Aeroplane. James G. Lyons, Stockton, Calif. (No. 1,759,164)

Retractable landing-gear. Grover Loening, New York, N. Y.; assignor to Loening Aeronautical Engineering Corporation, New York. (No. 1,759,197)

Aeroplane-propeller. Charles E. Smith, Oroville, Calif. (No. 1,759,469)

Retractable landing-gear. Grover Loening, New York, N. Y. (No. 1,759,652)

Shock-absorber for landing-gears. John F. Wallace, Shaker Heights, Ohio; assignor to Cleveland Pneumatic Tool Co., Cleveland, Ohio. (No. 1,759,674)

Aeroplane. Jan Hlavacek, Chicago, Ill. (No. 1,759,698)

Parachute safety suspension. Paul P. Horni, Newark, N. J. (No. 1,760,061)

Flight-altitude indicator. William C. Morris, Langley Field, Va. (No. 1,760,163)

Aeroplane. Curtis R. Morrison, Marshfield, Oreg. (No. 1,760,164)

Aeroplane-wing. Michel Wibault, Paris France; assignor to Vickers (Aviation) Limited, Westminster, England. (No. 1,760,332)

Flying-machine. John D. Van Vliet, San Francisco, Calif. (No. 1,760,386)

Airplane construction. Waldemar A. Endter, Long Beach, Calif. (No. 1,760,485)

Landing-gear. Charles W. Hall, Larchmont, N. Y. (No. 1,760,644)

Airship. Charles Giudice, Brooklyn, N. Y. (No. 1,760,692)

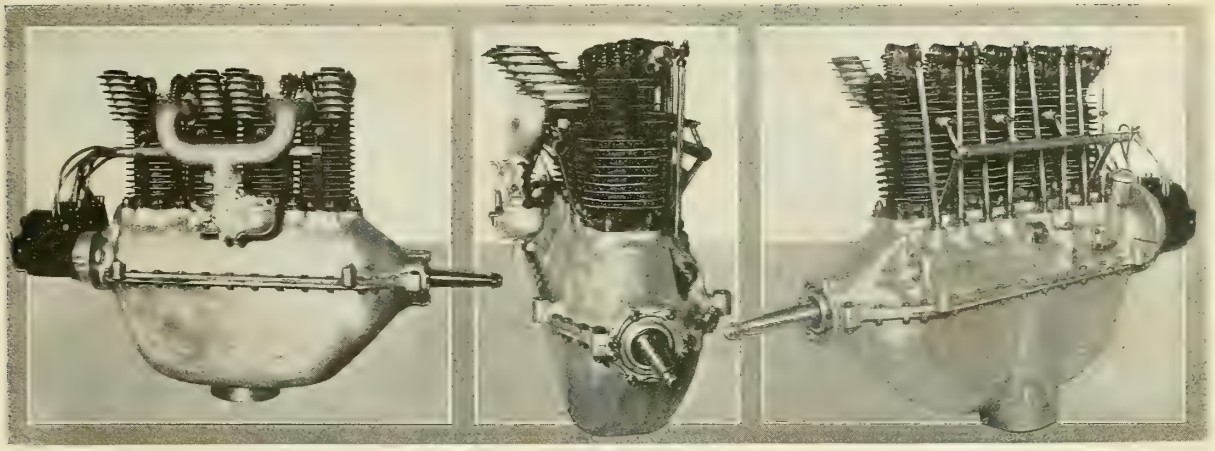
Aeroplane-wing. William F. Triplett, Grand Junction, Colo. (No. 1,760,726)

Control of aeroplanes. Mogens L. Bramson, Hendon, London, England. (No. 1,760,740)

Airplane-wing. James B. Slinn, Bonaparte, Iowa. (No. 1,760,787)

Airplane. Otto J. Barth, Kansas City, Mo. (No. 1,760,865)

Airplane-propeller. Ernest G. McCauley, Dayton, Ohio; assignor to Hamilton-Standard Propeller Corp. (No. 1,760,876)



THE GLOBE AERO ENGINE

THE Globe Tool and Engineering Company, Dayton, Ohio, has developed a four-in-line air-cooled aviation engine designed around the Model A Ford motor. This motor develops 50 horsepower and weighs less than 3½ pounds per horsepower.

The cylinders are of cast chrome nickel semi-steel and the crankcase of cast aluminum alloy. Pressure feed is maintained to all bearings by a special oil pump in a wet sump. The engine carries dual ignition.

The engine can be assembled using many standard Ford parts and adding such parts as cylinders, crankcase and valve mechanism which the Globe company has designed.

The cylinder and valve action has been designed for 60 horsepower at 2,500 revolutions per minute, and it was found that this power is developed with the use of a standard Stromberg aviation carburetor. The engine develops 52 horsepower at 2,500 revolutions per minute using the regular Ford carburetor which is satisfactory for low altitudes. The finished motor, dry, weighs only 173 pounds with two magnetos.

The motor was given endurance runs with a propeller at various speeds to determine weak spots. Small changes were made in valve spring designs, piston clearances and valve guide clearances.

Since the Ford crankshaft is not drilled for oil pressure, it was necessary to provide for pressure lubrication. This was done by drilling at proper places and then plugging all external holes. These plugs are of brass tightly pressed into place and then peened. Care was taken not to disturb the balance or to weaken the shaft. The crankshaft was then checked for balance. The crankshaft extension was designed to accommodate the thrusts and radial loads which would be set up by the propeller and at the same time take all strains off the crankshaft. The extension was then rigidly bolted to the crankshaft flange.

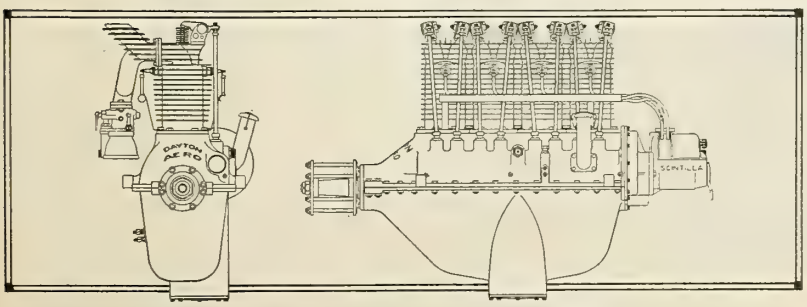
The Ford Model A camshaft was next given consideration. Because the rise of the cams would not give needed valve lift, it was necessary to use a special rocker arm with increased lift ratio. A Nash rocker arm was found which could be used. A lighter rocker arm was later designed and is recommended.

The use of this camshaft permitted the use of the standard Model A camshaft gear and crankshaft pinions. No change was made on the camshaft gear, but the crankshaft pinion was drilled for lightening.

Tests determined the Ford connecting rod could be used by making a slight change on the wrist pin bearing and by sealing the oil grooves for pressure lubrication. This of course resulted in using a Ford wrist pin and pressing aluminum plugs in the ends so as to make a full floating pin. The rods were then weighed and mated.

The Ford front main bearing caps were sealed for oil and used on all three main bearings. Ford tappets were used, the only change being the plugging of the oil hole.

The tachometer drive was taken off the camshaft by using a modified Ford pump drive pinion.



Propeller end and side view of the four-cylinder 50 horsepower Globe Aero Engine

The crankcase top half is made of aluminum alloy, heat-treated and well designed for strength and lightness. Many ribs are placed within the case to absorb all motor strain. The oil lines are all cast in the case, the main line running the length of the case consisting of a steel tube cast in and surrounded by a heavy wall of aluminum. This design eliminates breakage of oil lines due to vibration.

The crankcase lower half is aluminum alloy. The wet sump type has a 2½-gallon capacity. This can be removed for inspection of bearings without disturbing the engine mount.

The oil pump is driven from the camshaft with standard Ford drive pinion. In the wet sump design the pump is immersed in the well and surrounded by a screen which is removable through the bottom inspection plate. The pump is supported rigidly at the top and bottom.

The cylinders are made of chrome nickel semi-steel, with the head cast on, incorporating the best design in a domed combustioned chamber. This design permits of a B.M.E.P. of 100 pounds. Top overhaul by removal of a cylinder can be accomplished with an end wrench, removing only six nuts per cylinder.

The valves are of extra large area and are made of silicrome steel. A standard Indian valve can be used efficiently by making a slight change at the top of the valve stem and using special bushings. The rocker arm support is of heat-treated molybdenum steel, this support carrying a sturdy, hardened and ground bushing assembly which contains an extra large grease reservoir for rocker arm lubrication. This reservoir is filled by a Zerk fitting, one fill being sufficient for 100 hours.

The pistons are of trunk type, using a special aluminum heat-treated nickel alloy, with three rings above the pin. One ring is oil regulating.

A starter attachment can be supplied, this drive being taken off the crankstaft between the magnetos.

A choice of several carburetors can be had. The motor is fitted for either the standard Ford carburetor, special Globe aeronautical carburetor, or a standard Stromberg aeronautical carburetor.

The engine is mounted by four bolts.

FRENCH PURSUIT AIRPLANES

(PART 1)

Paul E. Lamarche

THE four largest air powers of the world at present are the United States, France, Italy and England. As far as numbers are concerned, France has the largest armed air force in the world today. (According to recent reports, France has 1,300 first line military aircraft in service; Italy, 1,100; the United States, 950; Great Britain, 780.) Actually the French military air force consists of approximately 4,000 aircraft, of which about a half are in service for first-line operations and training and the remainder kept ready for immediate assembly and service. Since the cessation of hostilities in 1918, the development of military aircraft has not ceased in those European nations which support large home industries. To France recognition must be given as one of the pioneers and leaders in the development of war planes. During the war French military aircraft established themselves as among the best that were used by any of the combattant nations.

Since the war, military aircraft design has, of course, progressed tremendously. Planes which were considered high performance ships twelve years ago are definitely obsolete today. The average maximum speed of pursuit ships is gradually approaching 200 miles per hour, whereas not so long ago 150 miles per hour was deemed exceptionally fast. The rate of climb and the service ceilings of military airplanes have also found new levels. The four nations with the greatest air forces have begun to compete with each other not only in producing planes of greater performance, but in developing world markets for their planes. We Americans know well the success of our planes in foreign lands, but many of us are unfamiliar with the planes produced by competitor nations.

French military aircraft represent the results of experiences gained from years of construction and service and conformity to high government standards. Competition among nations has also been one of the most potent stimulents in the peace-time development of war planes. Today French military planes hold a number of world records and are used by the air forces of many nations as standard equipment. In France war planes are classified according to the function for which they are designed; the more important of which are the type C1 planes or *avions de chasse,* which are single-seater pursuit planes; the A2 planes or *artillerie biplace,* which are two-seater observation or reconnaissance planes; and the B2 planes or *biplace de bombardment,* which are two-seater day bombers. There are also the BN2 planes or *bombardment de nuit,* two-seater night bombers, and the BN3 planes which are three-seater night bombers. The French aeronautical industry has also developed various types of planes for liaison work, as well as for training and primary instruction for the military service.

In this article, I propose to deal only with the C1 class of planes or single-seater pursuit ships. In France this class of military craft is well developed; some of the modern models are outgrowths of aircraft produced during the war that are well known to many American aviators who flew either in the American service or in the Lafayette Escadrille. Of the group of *chasse* planes described in this article, a number are standardized by the French army, as well as by other nations. Others, as will be noted in the following descriptions, are more recently developed and are still being experimented with prior to their adoption or rejection. It is not unusual for the Technical Service to experiment with a new plane for as much as a year, during which time numerous changes may be made before any decision is made as to its acceptance. Obviously, a new plane must be able to show better performances than any of the types already being used, though low cost of production, facility for repairs and general good efficiency may often gain favor even if the performance does not appreciably exceed that of existing types.

Outstanding among the *chasse* planes in France is a type developed since the war known as the Jockey type—single-seater pursuit ships with an empty weight not exceeding 2,646 pounds. These little ships show a very good performance for their weight, armaments and power, and are a specialized class of military aircraft.

Although more and more French constructors are using metal in wings and fuselages—in some cases they have gone in for all-metal structures—many of them still adhere to the mixed construction, and in some cases all-wood constructions. The few advantages which wood offers are gradually being offset by the use of improved metal alloys and engineering. So far, however, wood is the cheapest material.

On most of the French pursuit ships, the armament consists of two fixed Vickers or Darne machine guns firing through the propeller, though some of them carry heavier armament, with two additional Darne guns mounted in the wings which fire over the disc area of the propeller. About ten years ago experiments were made with a heavier gun firing through the propeller hub. In order to accomplish this, it was necessary to install a gearing system for the engine which did not last for more than a few hours during tests. Moreover, the planes tested had a tendency to become nose heavy. The French have been making numerous expermients in the use of heavier armaments, the results of which are not known. It is believed that a pursuit ship that can fire a few shots of large calibre instead of a volley of machine gun bullets will inflict the greater damage on its adversary. On the other hand, with the addition of heavier armaments, the performance of the pursuit plane is hampered.

Monoplanes predominate among French pursuit planes. They have a power range from 400 to 600 horsepower, and their endurance is between three and three and a half hours. A number of pursuit ships in France are built around the Hispano-Suiza engine, the shape of which lends itself to the formation of a well-streamlined nose. Other water-cooled power plants which are used are the Lorraine-Deitrich and the Renault. Gnôme-Rhone engines are the principal air-cooled type used.

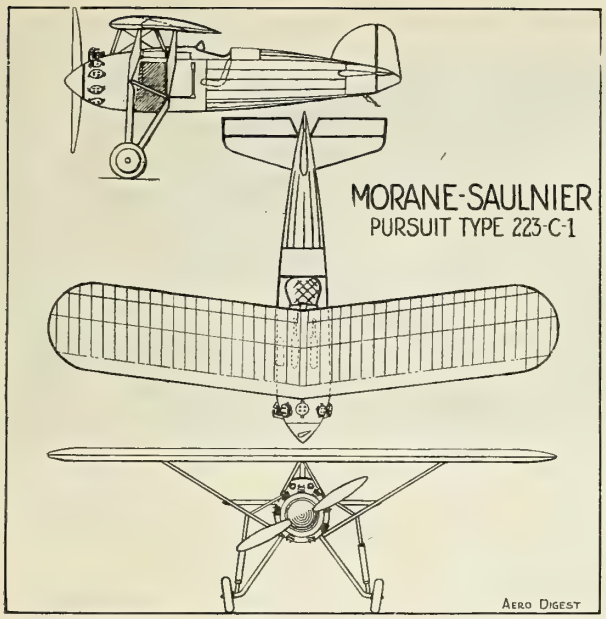
In January of this year an international competition for *chasse* planes was held at Brussels. In this meet a Dewoitine monoplane, piloted by Marcel Doret and powered with an Hispano-Suiza engine, won first honors; a Morane-Saulnier, piloted by Michel Detroyat and powered with a geared Jupiter engine, took second place. Campbell of England in a Bristol Bulldog took third place, and Vanderlinden of Belgium in a Renard monoplane, fourth.

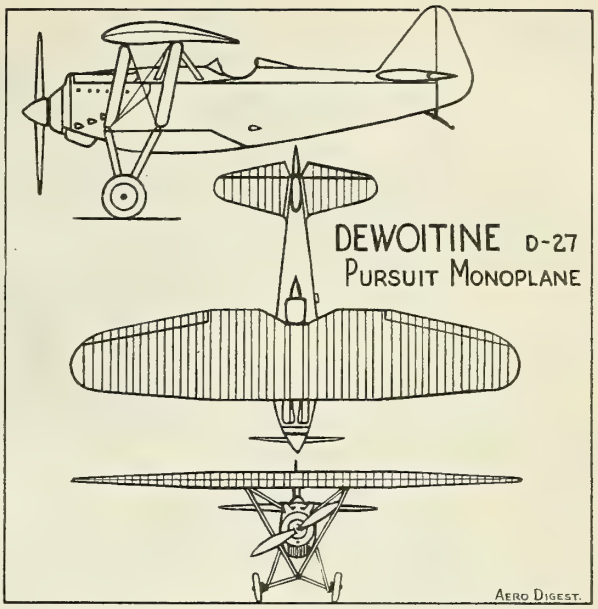


The 600-horsepower Morane-Saulnier Type MS222-C1 pursuit monoplane

Morane-Saulnier

Aeroplanes Morane-Saulnier is one of the older firms of French aircraft constructors, having beend founded in 1911. The Messieurs Robert Morane and Raymond Saulnier head this important company. Its plant, which normally employs 500 men, is located at Puteaux, an industrial town in the Paris region. For some time, Morane-Saulnier has been known for its parasol monoplanes, having developed a number of successful prototypes for military and training purposes. Last year an M.S.222-C1, piloted by Michel Dertoyat, won the Coupe Dreyfus at Vincennes by climbing to 22,970 feet in 12 min-





utes and to 26,825 feet in 20 minutes; and, as has been noted, one of these little planes took second place in the Brussels meeting.

The most recent Morane-Saulnier pursuit planes which are used by the French aviation are known as the M.S.221-C1, the M.S.222-C1 and the M.S.223-C1 and they are among the best produced by the French industry. These three models are practically identical, inasmuch as the 222-C1 differs from the 221-C1 only in that it has a geared Gnôme-Rhone Jupiter series VII engine that develops 600 horsepower instead of the Jupiter 460-horsepower motor. The 223-C1 differs from the other two in that it has a split axle landing gear with a wide track, while the other two types have the cross axle Vee type.

The Morane-Saulnier, a light *chasse* monoplane of the Jockey type, is of mixed construction. The wing spars, ailerons, bracing members, empennage, landing gear and the extremity of the tail are metal, duralumin being used principally. All other parts, including the wing ribs, fuselage longerons, transversals and stringers, are of wood. The semi-thick parasol wing has considerable sweepback, which is characteristic of Morane-Saulnier types. It is built up in two sections joined over the fuselage and supported by inverted V cabane struts. The wing is rigidly braced on both sides by a pair of oblique struts. On the M.S. 223-C1 the forward oblique struts are attached to a leg of the landing gear. The covering of the wing is fabric. The narrow chord ailerons, which extend the length of the trailing edge, can be used as flaps. The fuselage has an oval section, the forward part of which has a metal covering as far back as the cockpit, the aft section being fabric covered.

The pilot's cockpit, placed behind the trailing edge of the wing, is designed in conformity with the latest government regulations for the use of parachutes. The seat is adjustable in flight. The empennage is of the monoplane type with unbalanced flaps which are rigidly controlled. The stabilizer may be adjusted in flight, and the tail skid is steerable. The Jupiter nine-cylinder engine is furnished with a supercharger for work at high altitudes. Fuel is carried in a 70-gallon tank in the fuselage behind the motor; this tank is equipped with dropping gear. An oil tank of eight-gallon capacity is carried on the right side of the fuselage. The plane has full fire protection. The normal armament of Morane-Saulnier pursuit ships is two fixed Vickers guns firing rounds of 500 shots each through the propeller.

Specifications
(M.S. 222-C1)

Span	32.1 feet
Length	21.3 feet
Height	9.7 feet
Chord	5.5 feet
Wing area	172.16 square feet
Weight empty	2,088 pounds
Weight of fuel	448 pounds
Total weight	2,767 pounds
Wing loading	16.08 lbs. per sq. ft.
Power loading	4.6 lbs. per horsepower
Track of landing gear	6.4 feet
Speed at 13,100 feet	165 miles per hour
Climb to 23,000 feet	12 minutes
Climb to 26,900 feet	20 minutes
Theoretical ceiling	39,370 feet
Endurance	5 hours

(M.S. 223-C1)

Span	32.1 feet
Length	21.9 feet
Height	9.8 feet
Chord	5.5 feet
Wing area	172.16 square feet
Track of landing gear	8.8 feet
Weight empty	2,115 pounds
Total weight	2,778 pounds
Speed at 11,975 feet	170 miles per hour
Climb to 16,400 feet	11 minutes 8 seconds
Climb to 26,248 feet	23 minutes 59 seconds
Theoretical ceiling	32,155 feet

Dewoitine

The Dewoitine D-27-C1 is one of the fastest of French pursuit planes and is built by the Société Aéronautique Française of Chatillon-sur-Seine which was founded in 1922. The plane is also built in Switzerland at Thun and used by the Swiss military air force. In the international competition for *chasse* planes at Brussels this year a D-27 piloted by Marcel Doret won first place, as mentioned. When he flew his entry from Paris to Brussels for the competition he covered the distance of 170.8 miles in 51 minutes at an average speed of 200 miles per hour.

The D-27-C1 is an all-metal parasol wing single-seater of the Jockey type which is powered by a 500-horsepower Hispano-Suiza motor. The parasol wing is in one piece and is supported on both sides by two pairs of struts, one from the top and one from the bottom fuselage spars. The spars and ribs are of duralumin with fabric covering. The ailerons are of narrow chord and are unbalanced. The fuselage is of monocoque construction, built entirely of duralumin and has a covering of duralumin sheet riveted to channel section formers which are reinforced by light tubular longerons. The empennage is of the monoplane type with no external bracing. Its elements are built up of duralumin frames with a covering of duralumin sheet. The landing gear is composed of two units in Vee and a centrally hinged axle that is carried by a Vee shaped cabane. The fuel tank is carried under the fuselage and can be dropped in an emergency. It has a capacity sufficient to give the plane a range of 500 miles. The underslung Lamblin radiator is carried under the nose of the plane. The ship has a standard armament of two Vickers guns firing through the propeller.

Specifications
(D-27-C1)

Span	32.1 feet

(*Continued on following page*)

(*Continued from preceding page*)

Length .....21.3 feet
Height .....9.1 feet
Wing area .....182 square feet
Weight empty.....2,138 pounds
Disposable load..... 882 pounds
Total weight.....3,020 pounds
Range .....500 miles
High speed (sea level)..180 miles per hour*
Speed at 16,400 feet.....165 miles per hour*
Landing speed.....55 miles per hour
Climb to 16,400 feet....9 minutes 44 seconds
Ceiling .....30,000 feet

**The latest of these planes has a maximum speed of 192 miles per hour and a speed of 183 miles per hour at 16,400 feet altitude.*

Bernard

Bernard planes are best known to readers of AERO DIGEST through the *Oiseau Canari* (*Yellow Bird*), which won transatlantic honors last summer. The Société des Avions Bernard is also known as the producer of the low-wing monoplane in which M. Bonnet set up a speed record for landplanes in 1924. The Bernard 20-Cl, which is undergoing tests for military acceptance, is built somewhat after the design of the *Ferbois*, as the record plane was known. The 20-Cl was exhibited at the Salon de l'Aviation in Paris in 1928 and since then has been undergoing tests, various changes having been made to make it worthy of acceptance for pursuit work. As with most Bernard types, this little monoplane is built entirely of wood.

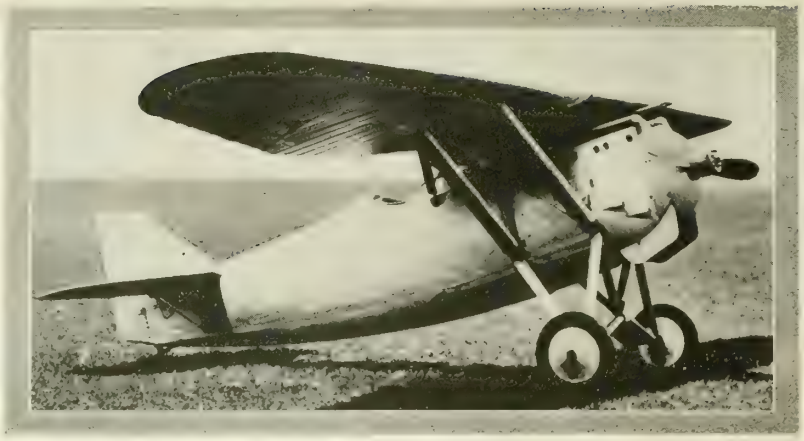
It is designed as a single-seater pursuit monoplane of the low-wing type and has a one-piece cantilever wing which is faired at the center to the full cross section of the fuselage. Towards the tips, the low wing tapers both in chord and thickness. The wing is built entirely of wood and has a plywood covering. Its structure is too complex to be described in detail in an article dealing with so many planes. The ailerons are inset and reach to a point near the wing tip.

The central part of the fuselage, which in reality is also the center section of the wing, carries the engine mount in the form of four steel longerons. The after part of the fuselage has an oval section and is covered with plywood. The pilot's cockpit, located beind the wing, is furnished with a windshield, the frame of which is of steel and which is designed to afford the pilot protection in case of an upset. It is capable of resisting a force calculated between four and five tons. Protection of the pilot is further assured by a streamlined headrest of particularly robust structure. The cockpit is fitted with an adjustable seat which can be easily regulated in flight by means of a lever.

The empennage is of the monoplane type, and its units are integral with the fuselage. The elevating planes are balanced. As in the case of the wing, they are of wood construction with plywood covering. The undercarriage is of the cross axle Vee type and is composed of two streamlined wooden Vees which are tied by two steel tubes at their bases. The Bernard *avion de chasse* is powered by an Hispano-Suiza engine which develops 400 horsepower at 2,000 revolutions per minute. The radiator is underslung and carried between the legs of the landing gear. The main fuel tanks are installed in the outer sections of the thick wing and may be dropped. The oil cooler is placed in the nose. Two fixed Vickers guns firing through the propeller constitute the armament.

Specifications

Span .....35.4 feet
Length.....24.6 feet
Height.....8.2 feet
Wing area.....172.16 square feet
Weight empty.....2,255 pounds
Weight of fuel.....335 pounds
Total weight.....3,020 pounds
Wing loading...17.5 pounds per square feet
Power loading...7.5 pounds per horsepower
High speed (sea level)..198 miles per hour
Speed at 13,100 feet....185 miles per hour
Ceiling.....30,350 feet



Dewoitine D-27-C1 monoplane with 500-horsepower Hispano-Suiza engine

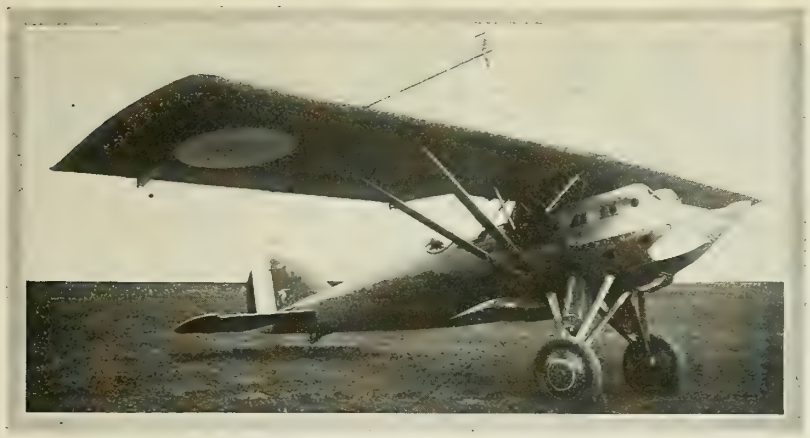
Amiot

The Amiot 110-Cl is constructed by the Société D'Emboutissage et de Constructions Mécaniques, a firm which has been constructing Latham flying boats and planes designed by the engineer, Amiot, for some time. Its aircraft construction works are in Colombes, near Paris. They are now a part of the newly formed Société Génèrale Aéronautique. The 110-Cl, described here, has been undergoing the usual period of testing at Villacoublay, and it is understood that an improved version of this pursuit ship will shortly be introduced. Because of the interesting features incorporated in the construction of this plane available details are given here.

This little ship is a single-seater Jockey type braced parasol monoplane of all-metal construction. The wing is in two sections, joined over the fuselage and supposted by inverted V-cabanes struts. It is braced by V-struts on both sides whcih reach to the bottom longerons of the fuselage. In form, the wing is rectangular with a slight sweepback; in structure, it is built up of metal spars and ribs and has a covering of duralumin sheet. The unbalanced narrow chord ailerons extend over all of the trailing edge and can be used as flaps. The fuselage has an oval section, is built entirely of metal and has a light duralumin covering. The



The Bernard 20-C1 single-seater pursuit plane powered with a 400-horsepower Hispano-Suiza engine



The Amiot 110-C1, a 500-horsepower single-seater of all-metal construction

cockpit is placed behind the wing where an exceptionally wide cutout in the trailing edge of the wing affords good visibility. The empennage is of the monoplane type with unbalanced surfaces. The landing gear is of the split axle type and consists of two sets of rigid V-struts and bracing members. The Amiot 110-C1 is powered by an Hispano-Suiza 500-horsepower engine which is cooled by Lamblin radiators suspended in the landing gear. The fuel tank is carried at the bottom of the fuselage and has an airfoil section in the form of two stub wings, one on either side. It is provided with dropping gear. The armament of the S. E. C. M. is two Vickers guns firing across the propeller.

Specifications

Span	34.4 feet
Length	21.3 feet
Height	9.1 feet
Chord	7.2 feet
Wing area	225.9 square feet
Track of landing gear	5.5 feet
Weight empty	2,469 pounds
Weight loaded	3,307 pounds
Wing loading	14.6 pounds per square feet
Power loading	6.6 pounds per horsepower
High speed (sea level)	180 miles per hour
Speed at 13,100 feet	170 miles per hour
Stalling speed	60 miles per hour
Landing speed	50 miles per hour
Climb to 13,100 feet	8 minutes
Ceiling	26,250 feet

Loire-Gourdou-Leseurre

Loire-Gourdou-Leseurre monoplanes are built by the Ateliers et Chantiers de la Loire, an important French naval dockyard and shipbuilding firm of Saint Nazaire, which took over the interests of the Messieurs Gourdou and Leseurre in 1925. In 1929 this firm created an aircraft department in which it now employs 600 men in the construction of L-G-L planes. The L-G-L 32-C1, which has been accepted by the French and other European air services as a standard pursuit plane, is especially adapted to high altitude work. It was in one of these parasol monoplanes that the well-known French pilot, Lemoigne, made several notable attempts to break the world's altitude record, and he is the present holder of the French record which stands at 38,705.9 feet. The service ceiling of the standard 32-C1 monoplane is 31,795 feet with the Jupiter 420-horsepower engine.

The 32-C1 is a single-seater fighter of mixed construction. It has a high braced wing which is supported over the fuselage by a pair of inverted V cabane struts in steel tube and by slightly splayed struts which are attached to the upper fuselage longerons. The wing is braced on both sides by a pair of oblique tubular steel struts extending to the bottom fuselage longerons. They in turn are braced by diagonals and cross pieces. The wing is built up of two steel and duralumin spars and wooden ribs, with a covering of fabric. The long narrow chord ailerons are of duralumin, fabric covered. The fuselage has a rectangular section and is built up of duralumin longerons and bracing members. The forward part, as far aft as the cockpit, has a metal covering and the after section is fabric covered. The cockpit is placed under the wide cutout in the *bord de fuite,* or trailing edge of the wing. The landing gear is of the cross axle Vee type and is built of tubular duralumin members. The empennage is of duralumin construction with fabric covering, and no surfaces are balanced.

The 32-C1 is normally powered with the 420-horsepower Jupiter engine, though recently the series VII geared Jupiter 600-horsepower engine has been used. When used for pursuit work, the ship can be equipped with the two standard fixed Vickers guns firing through the propeller and two Darne guns mounted in the wing and firing outside the propeller disc area. The L-G-L monoplane is known as the 33-C1 when powered by the Lorraine-Deitrich 500-horsepower water-cooled motor; as the 341-C1 with an Hispano-Suiza 600-horsepower engine, and as the 35-C1 with the Renault 500-horsepower water-cooled engine.

Specifications
(32-C1)

Span	40 feet
Length	24.7 feet
Height	9.6 feet
Wing area	269 square feet
Weight empty	2,123 pounds
Useful load	617 pounds
Weight loaded	3,020 pounds
Wing loading	11.2 pounds per square foot

Performance
(Jupiter 420-horsepower engine)

High speed (sea level)	155 miles per hour
Speed at 16,400 feet	149 miles per hour
Speed at 26,200 feet	130 miles per hour
Landing speed	56 miles per hour
Ceiling	31,900 feet
Climb to 16,400 feet	12 minutes
Climb to 26,200 feet	31 minutes

(Jupiter 600-horsepower engine)

High speed (sea level)	167 miles per hour
Speed at 9,800 feet	161 miles per hour
Speed at 16,400 feet	155 miles per hour
Speed at 26,200 feet	133 miles per hour
Landing speed	56 miles per hour
Climb to 6,500 feet	3 minutes 5 seconds
Climb to 16,400 feet	11 minutes
Climb to 26,200 feet	31 minutes
Ceiling	32,800 feet

(To be concluded in the August issue)

MOLDED PULLEYS

A NEW design of pulleys for use in the control systems of aircraft has been developed by the General Electric Company, of Schenectady, N. Y. The pulleys are made of Textolite, a compound molded to shape around Norma-Hoffman ball bearings. The bearings are of the single-row, self-contained type, and the compound consists of selected sheets of linen impregnated with a phenol compound and molded under high pressure.



The French pilot Lemoigne and his altitude record holding L-G-L 32 C-1 fighter



WATKINS "CANARD" TYPE "FLOATER"

A HIGHLY EFFICIENT SINGLE PUSHER

By

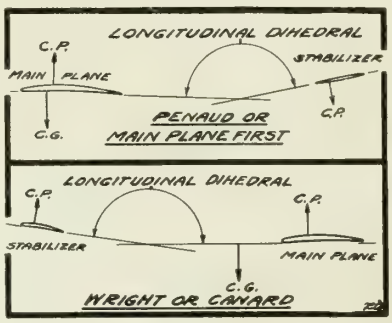
R. E. DOWD

HOW would you like to know about a model which flew a full half mile on its maiden voyage? Just think of that—a new, untried model of a rather radical design takes the air for the first time, and alights a full half mile away! And why not build such a model, too! She's a beauty on the ground and once she takes to the air she is about the prettiest thing that ever flew.

Of all flying models the so-called "floaters" are undoubtedly the most graceful and picturesque. With the majesty of an eagle they sweep silently along, turning circle upon circle, often spanning the horizon in a single flight. Ordinarily in "floater" models everything has been sacrificed to cut down the weight so as to reduce flying speed. This practice too often leads to frail, delicate construction which will weave and distort at the mercy of even the slightest gust. Such models are not reliable fliers and will tax the patience of even the most experienced builders.

The Watkins' floater is not in this class. It is strong, rugged and a consistent flyer under all ordinary conditions. It reflects the long experience of the builder, Frederick Watkins of Forest Hills, Long Island, N. Y. In 1910 Fred was designing and building models and winning prizes, too. As a member of the Aero Science Club of New York City, his models always gave a good account of themselves. More recently he has studied aerodynamics and the model we have here is the result of this study.

Note how carefully it is streamlined. It is the last word in aerodynamic efficiency. Instead of extreme lightness at the cost of strength, the Watkins' floater is fairly heavy but exceptionally efficient. After all we only need our rubber motors to push our models against the air resistance at a speed necessary to sustain them, so if we reduce that air resistance to a minimum by careful design we can still drive our model with a small quantity of rubber. We all know that *less* rubber means *more* turns and consequently *greater* duration. Also we know that a streamlined model will glide at a *better gliding angle* and this, too, means more duration.



This does not mean, of course, that light weight is not desirable, for if we were to take two power-driven models of equal size, shape and design, but of different weights, the lighter one would fly with less power and consequently give better duration. But it does mean that if we make our models so light as to be fragile, and at the same time ignore the aerodynamics of the design, our power required is likely to be greater than if the model were slightly heavier but better streamlined. This is all simple if we stop to reflect on it.

For the photographs accompanying this article we are indebted to Mr. William Ray of Baltimore, Md., whose floater model, patterned closely after the Watkins' design, is also beautifully streamlined. Available photographs of the Watkins' floater show the model high in the air and are unfortunately lacking in details.

The "Canard" Type

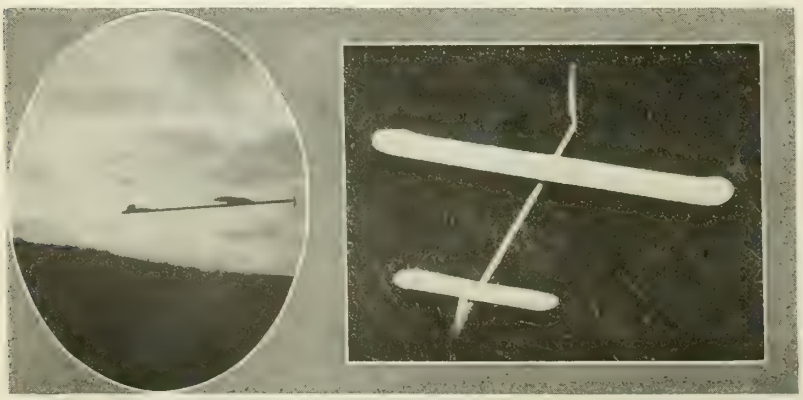
Before we proceed with our description it would be well to understand the so-called "Canard" or "tail first" principle of stability. Referring to the diagram we note the conventional type or the Main Plane First type shown at the top of the diagram. Don't let a diagram scare you. Diagrams are simply pictures to convey an idea.

Back in 1871 an ingenious French experimenter named Penaud designed and made a model airplane which is believed to have been the first mechanically-driven flying machine embodying correct principles of fore and aft stability. He even flew this rubber-driven model in public for a distance of 40 meters with a duration of 12 seconds.

The Penaud principle of fore and aft or longitudinal stability is shown in the diagram and is sometimes referred to as a longitudinal dihedral, as indicated. In the diagram the main plane carries the weight of the airplane, indicating by C.G. (center of gravity) by virtue of the lift, represented by C.P. (center of pressure), which is normally about one-third back from the leading edge of the wing. The stabilizer, however, has *less* angle, as shown, exaggerated. In many cases this means an air load on the stabilizer acting downward. In such cases the center of gravity is slightly forward of the C.P. in order to balance. The important thing is the dihedral, or to say it in another way, a heavier load per unit of area on the forward plane.

When our American Wright Brothers took up their gliding experiments in 1900 they introduced the "Canard" or tail first type of airplane. The name comes from the French, meaning "duck," which, of course, does not actually fly tail first, but which has

(*Continued next page*)



William Ray's Canard type floater gliding at its normal flat angle after a flight. Right: the model as it appears when on the ground



16,000 MILES OF DAILY SCHEDULED FLYING

WESTERN AIR EXPRESS announces the opening of its new passenger line between El Paso and Dallas, bringing the total of its daily scheduled flights to more than 16,000 miles. The new line affords alternate routes between Dallas and Los Angeles . . . one via Amarillo and Albuquerque and the other via El Paso. Western Air Express is daily fulfilling its pledge to create a network of air transport lines adequate to serve the growing needs of the great West and second to none in the world.

The full story of its immense facilities can be obtained from leading hotels, travel bureaus, steamship and railway ticket offices or direct from Western Air Express offices in all principal cities from Kansas City west and in St. Louis (New Hotel Jefferson), Cleveland (214 Hippodrome Bldg.), Chicago (Palmer House) and New York (Graybar Bldg.)

WESTERN AIR EXPRESS

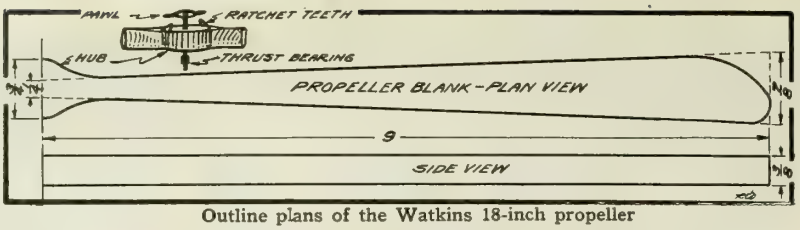
(*Continued from preceding page*)

such a long neck it gives that impression.

Again referring to the diagram we have the longitudinal dihedral for the Canard also, but this time it is the stabilizer which carries the greater unit load because it is the forward plane.

The Wrights used the Canard type for many years before changing to the main plane first form. The outstanding advantage is the freedom from a nose dive following a stall or loss of flying speed. This was the object of adopting it originally and even today we find many believers in the system, particularly in Germany. Here's how it works.

We know that when an ordinary wing section meets the air at an angle of incidence or angle of attack greater than about 16 degrees that the lift falls off abruptly. In the main plane first type this means that the only source of lift is suddenly cut off and the plane dives down until it regains flying speed and a correct flying angle. In the Canard the stabilizer stalls *first* because it has a greater angle of attack. The main plane still lifts satisfactory and because the stabilizer has lost its lift it drops down to a smaller angle of attack. Here stability is restored without any great loss of height or any sort of a nose dive. Another advantage, which will be apparent from the diagrame, is that in the Canard arrangement both surfaces lift. There is no surface designed to carry on air load—everything works for its transportation. That means



Outline plans of the Watkins 18-inch propeller

efficiency.

Possibly all this may sound a little advanced, but if the diagrams are studied it will be so simple and obvious that even beginners can readily understand it without difficulty.

This discussion has led us away from the Watkins floater, but it gave us an opportunity to study the principles of stability. Let's now proceed with the construction:

Start with the Fuselage

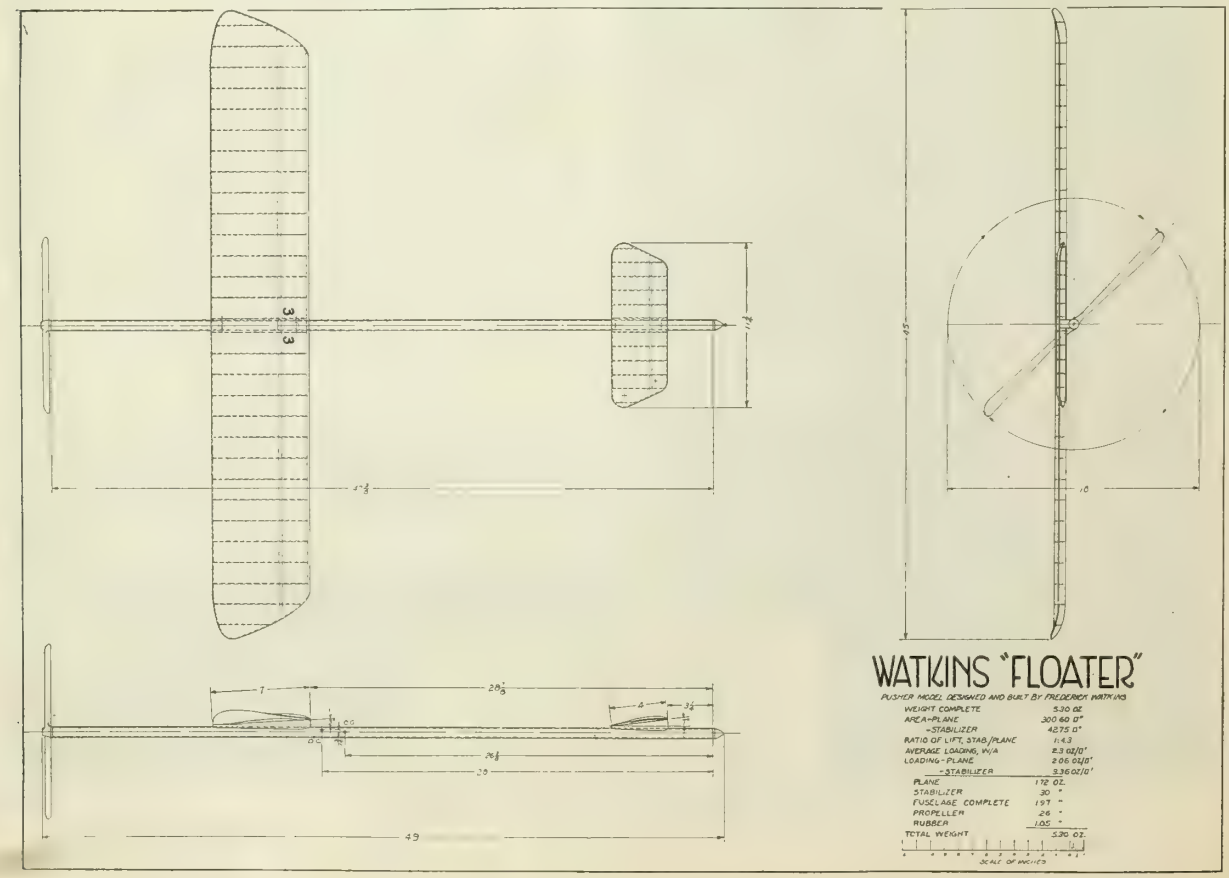
As in some of the other models described in Junior Activities, the fuselage is tubular, being rolled from white pine or basswood 1/32 thick over a dowel ⅞ diameter. The dowel is used as a former and the sheet of wood is soaked in hot water to soften it before forming. The ¼ lap joint is not cemented until the wood is thoroughly dry. A coat of paraffin will be found effective in preventing the tube from sticking to the dowel.

Both ends of the fuselage tube are reinforced by flanged plugs of white pine. These plugs are turned to fit snugly in the inside of the tube shell to a depth of ¼ of an inch. A flange 3/16 thick the outside diameter of the tube is turned integral with the plug. A ⅜ square hole is provided to receive the propeller shaft bearing block and the nose block. The former has a 3/16 thick x 15/16 diameter flange and a ⅜ square by ⅜ long shank. The latter has the same shank proportions, but instead of the flange a streamlined nose is used ⅝ long. The rubber strands are anchored onto a 1/16 diameter wire hook which passes through the nose block and forms into a loop for the winder attachment.

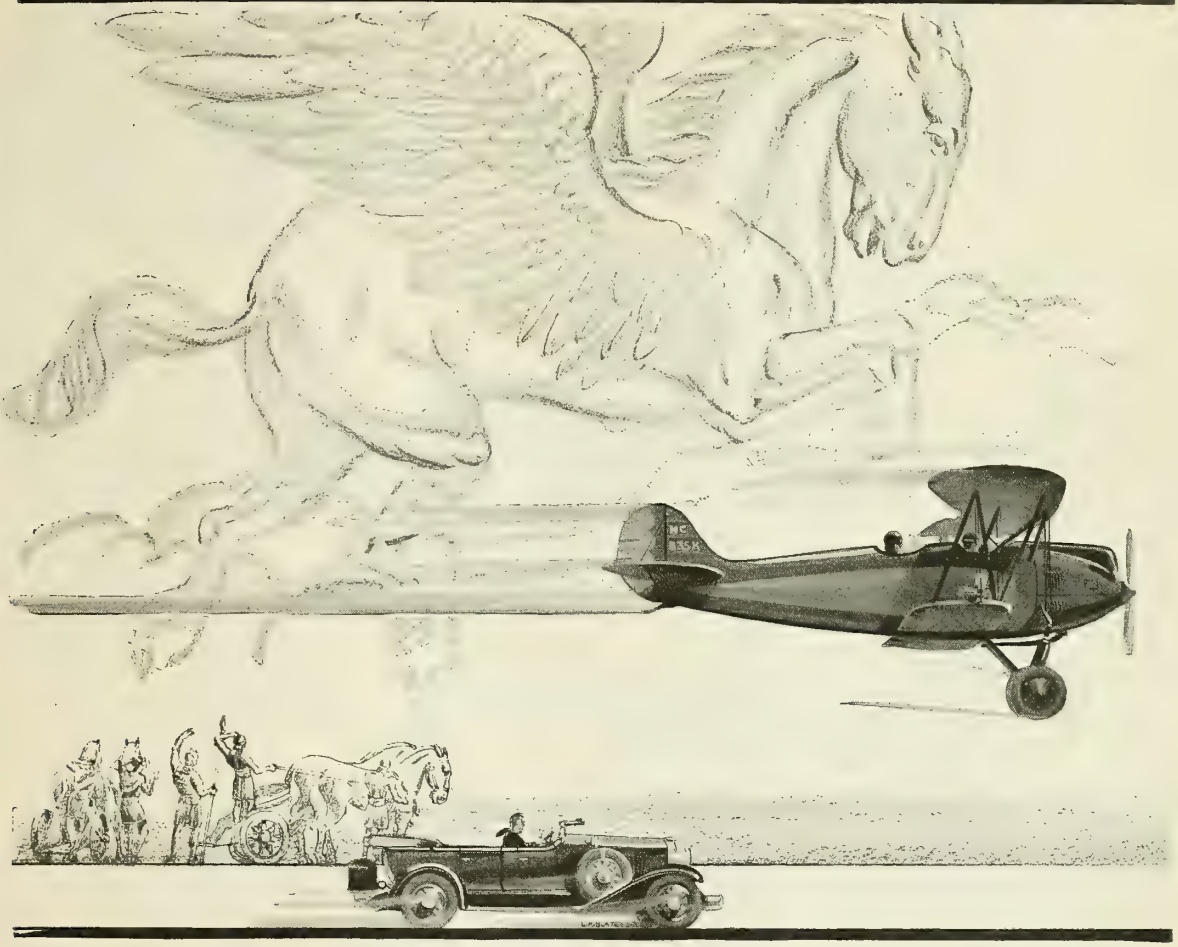
Main Plane

The main plane is a wonderful piece of workmanship. Although it embraces over 300 square inches of surface, the weight is only 1.76 oz. However, this is not by any means the lightest plane for its size that has ever been constructed; but for an accurately built, double surfaced plane, having closely spaced ribs and a substantial spar, it is remarkably light and efficient.

(*Continued on next page*)



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Contractors to the United States Army and Navy

(Continued from preceding page)

The spar is rectangular in section being 7/32 wide by 3/16 deep. The leading edge is shaped to conform to the nose of Eiffel No. 32 wing section and is 7/32 wide. Both the spar and the leading edge are of spruce. The ribs are cut from 1/32 thick basswood veneer to Eiffel No. 32 pattern. The two end ribs are made to approximate this same section, but are considerably reduced both in chord and section. All ribs are provided with a 7/32 by 3/16 hole which receives the spar.

In assembling the plane the ribs are simply slipped into position and cemented in place. The spacing is 1⅛ apart for the two center ribs and 1½ for all others, except the outer two which are 1⅝ apart. The top curve of the two center ribs is made just as in all the others, but the bottom edge is straight, being the tangent line to standard wing section Eiffel No. 32. A piece of 1/32 thick basswood is cemented onto these bottom edges so that a good, rigid center construction is provided for the attachment of the two large size dress snaps, as indicated on the drawings. These snaps are sewed on with fine wire.

The wing tips and trailing edge are of bamboo ⅛ wide by 1/16 thick. As indicated in the drawing the wing tips are slightly upturned to improve lateral stability. There is not a single piece of thread used in the entire wing. All joints are carefully made with waterproof cement only and the finished wing is splendid evidence of the perfect practicability of this method of construction. The covering material is Japanese tissue "doped" on with several coats of banana oil.

Stabilizer

Since the construction of the stabilizer is the same as that of the main plane, it will be simply necessary here to mention the sizes of the different parts, which are as follows: Spar, 5/32 wide by 3/32 deep; leading edge, ⅛ wide; wing tips and trailing edge, 3/64 square bamboo; center ribs, 1 in. apart; regular rib spacing, 1 in.

Both plane and stabilizer are mounted on light spruce plane hangers at the incidences given on the drawing. These plane hangers are carved to fit the fuselage tube snugly. Their purpose is to furnish a base for the attachment of the dress snaps. These snaps cooperate with the other parts which are sewn onto the center pieces of the plane and stabilizer. All excess material is carefully removed from these hangers so that they are really nothing more than skeletons. Owing to the flat surface on the center pieces of the plane and stabilizer, which bears directly on to the flat top surface of the plane hangers, any tendency for the parts to rock is obviated. When trial has determined the correction postion of the lifting surfaces the plane hangers may be cemented fast in position. Until that time it is advisable to allow for adjustment by attaching with rubber strands.

Fins

No fins of any kind are shown on the drawing. Experiments have indicated that greater stability and more direct flights are possible by the addition of a slight amount of fin surface above the C.G. It is doubtless only because of the inconvenience of chasing the model across creeks, fences and into private property, that such fins have not become a permanent part of the design, for the builder readily agrees that the flights are improved by such fins.

Propeller and Power Plant

The propeller for this model is perhaps the most extraordinary part of it. It is 18 inches in diameter and has a pitch of approximately 21 inches. In the large drawing it may best be studied in the front view where it appears in its true proportions. It will be noticed that the blades are extremely long and narrow. With the aid of a few of the more important dimensions of the blank, which are given on the detail sketch, any experienced model builder ought to be able to reproduce easily this very efficient propeller. The dimensions of the blank, which is white pine, are as follows: Diameter of hub ¾ inch on front face, ⅝ on rear face; thickness along blade except at the extreme tip ⅜; maximum width of blank ¾; minimum width of blank 5/16.

In carving, considerable material is allowed to remain near the hub for strength, but the actual driving portions of the blades are carved very thin and are slightly cambered. A 1/16 diameter steel shaft working in a tubular brass bearing with a couple of copper spacing washers constitute the bearing. The propeller is driven through a swivel (see detail) which reduces the resistance during the glide by allowing the propeller to revolve freely.

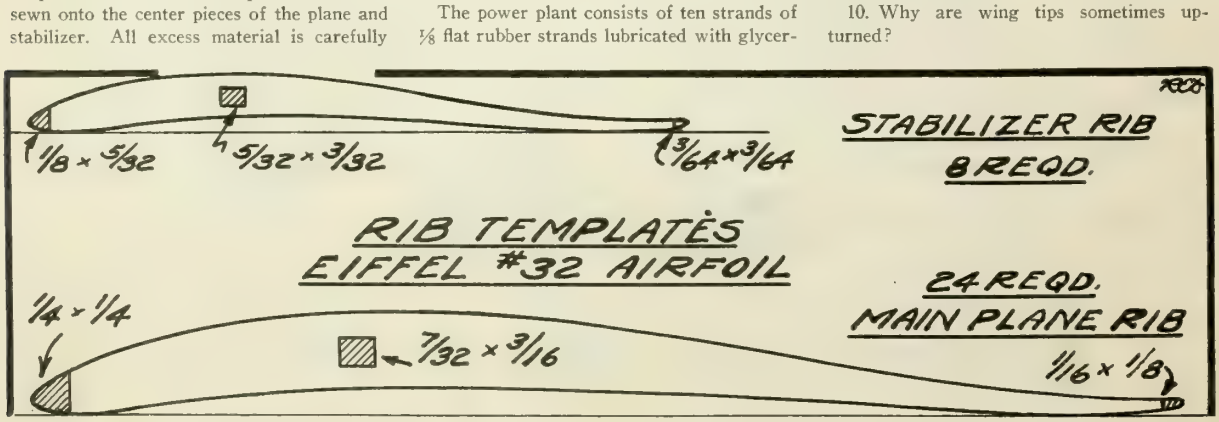
The power plant consists of ten strands of ⅛ flat rubber strands lubricated with glycerine and strung up so that there is not a great amount of slack.

Performance

It is a pleasure to describe the maiden voyage of this model which it was my privilege to witness. After a few preliminary glides to test the balance a trial flight was attempted on the outlying agricultural grounds of Cornell University. A slight breeze of approximately 3 or 4 miles was blowing. After winding the strands up to an ordinary tension, the model was released, not launched, against the wind. Immediately the great 18-inch propeller started revolving at a velocity noticeably slower than on the ordinary model. It was, however, quite evident that there was ample thrust as the model immediately started gaining elevation in majestic circles and drifting with the wind. The circling seemed to die out when an altitude of approximately 150 feet had been attained and the model set out across country. It was impossible to measure the distance without surveying instruments, but a conservative estimate would place it at one-half of a mile. This is the more remarkable when we consider that it was the maiden voyage and that the rubber motor was not wound to its capacity. Since this first flight the model has made countless flights of varying distances and durations so that we may safely say that it has proven itself a most remarkable and dependable flyer.

We have many things to remember this time:

1. Who discovered the principle of longitudinal stability?
2. What year was the discovery made?
3. Who invented the Canard type of airplane?
4. Can you explain the difference between the Penaud and the Wright system of stability?
5. Name an advantage found in the Canard.
6. What is the origin of the name "Canard?"
7. Explain the importance of a good aerodynamic design in a model airplane.
8. How does it affect the power required?
9. At about what angle does a wing lose its lift and "stall?"
10. Why are wing tips sometimes upturned?



Full size drawings showing contours of the ribs used in the Watkins model

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WESTERN NEWS

DEDICATION OF UNITED AIRPORT HELD

CEREMONIES coincident with the dedication of United Airport, Burbank, Los Angeles County, Calif., were held during a three-day period from May 30 to June 1. Racing events included in the program were directed by the contest committees of the Southern California Chapter of the N. A. A., under the rules of the F. A. I. Concerts were given by the Burbank Municipal Band. Dances terminating the events on the first two days were held on the Roof Garden of the Terminal Building.

The events on May 30 included the dedication and formal opening attended by members of the Early Birds, Civil War Veterans, and the American Legion; landing of the Goodyear blimp *Volunteer;* arrival of the 95th Aero Squadron and 11th Bombardment Squadron from Rockwell Field, San Diego; powered glider demonstrations under the supervision of Capt. Merle Nelson; the Frederick B. Rentschler Trophy Race for airplanes of 400-cubic-inch displacement or under, won by Dick Deeds, Fleet; and the Hamilton Standard Propeller Trophy Race for Airplanes of 1,000-cubic-inch displacement or under, won by Payton Gibson, Cessna.

On May 31, the events included flights by planes of the Naval Air Station, San Diego; a model plane contest; a relay race open to teams of two planes each, won by Gladys O'Donnel and Dick Deeds, Fleet; Pratt and Whitney Women's Trophy Race, won by Bobby Trout, Great Lakes; Free-for-all race, won by Lee Schoenhair, Lockheed Vega; William E. Boeing Trophy Race open to officers of the 95th Pursuit Squadron, won by Second Lieut. W. R. Casey, Boeing Pursuit; sham battle and fighting maneuvers by the 7th Bombardment Group; under the command of Major Spatz; and glider demonstrations.

The events on June 1 included formation flights by Army and Navy planes, commercial flying and demonstration flights. A ground exhibition of airplanes, gliders and aeronautical accessories was held in conjunction with the dedication during the three-day period.

Victor Clark was master of ceremonies; Earl Ovington, official starter; and Joe Niekrent of the N. A. A., official timer.

Herbert Hoover, Jr., Heads New Engineering Division of Western Air Express

HERBERT HOOVER, JR., has been appointed head of a new engineering division of Western Air Express, which consists of supervision of the operation and maintenance of four departments, according to a recent announcement of Jack Frye, director in charge of operations of W.A.E.

Mr. Hoover was formerly chief of communications and assistant to the president of the company. Under the new plan, this department is one of the divisions of airports under his jurisdiction, in addition to the departments of airports and airways, and the dissemination of weather information and aeronautical engineering. Radio telephony and telegraph is included in the communication department.

J. G. Franklin has been appointed directly under Mr. Hoover in charge of communications, and F. C. Whiting in charge of airports and airways. Heads for the other two departments were not named.

Grouping of these various units under one main division and under one head was made as the result of the expansion of the operations of Western Air Express. The reorganization followed an analysis of operation requirements by Mr. Hoover and other company officials.

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THE LOS ANGELES MUNICIPAL AIRPORT DEDICATION

DEDICATORY ceremonies of the Los Angeles Municipal Airport were held June 7-8. The airport was formerly known as Mines Field.

The program of events included airplane speed races; dead stick landing and balloon strafing contests; and aerial exhibitions by planes of the Air Corps, Naval Air Service, Marine Corps, National Guard, and civilian aircraft. The dedicatory ceremonies were opened with a concert given by the Municipal Band and the Los Angeles Fire Department Band. This was followed by the arrival of military aircraft participating in the events. The airport was then formally dedicated with ceremonies which included addresses by Mayor John C. Porter of Los Angeles; John C. Austin, president of the Los Angeles Chamber of Commerce; and Gen. R. E. Mittlestaedt of the California National Guard.

The remainder of the program on June 7 was devoted to glider demonstration and airplane contests. The events and winners were as follows: a three-lap race of fifteen miles open to women for flying ships with a displacement of 400 cubic inches, Golanda Spirito, using a Great Lakes; a three-lap race of fifteen miles for planes with an 800-cubic-inch displacement, Payton Gibson, flying a Cessna; a five-lap free-for-all speed contest, Payton Gibson in a Cessna; and a dead stick landing contest, Milo Borchana, winner. The balloon strafing contest was won by Lee Flanigan.

The second day of the dedicatory events was known as Educational Day. The events included a model airplane exhibition; aerial demonstration by students of the Curtiss-Wright Flying Service; formation flights by Air Corps planes from Rockwell Field, and March Field; a demonstration of flight by the use of instruments entirely; and commercial flying.

The dedicatory program was under the supervision of Col. Richard Barnitz, director of airports. The chairmen of the comittees in charge of the dedication were as follows: Woodruff DeSilva, general chairman; Rufus Pilcher, operations; M. B. Bosworth, Air Corps arrangements; W. K. McCreery, radio; John Cassidy, publicity; Maj. T. J. Walkup, parking and police; John Bowers, entertainment; W. H. Hitchman, reception; and Thomas Thomas, program.

Victor Clark was master of ceremonies; Earl Ovington, official starter and Joe Niekrent of the N. A. A., official timer.

STATISTICS recently released by the West Coast Air Transport Corporation, operators of the Portland-Seattle-San Francisco route, show that the trimotor Fokkers operated by the organization, have completed a total mileage of more than 300,000 miles, since operations began in July, 1929. This distance was flown without an accident to passengers, planes or pilots.

The volume of passenger traffic during May increased approximately 200 per cent over the first month in 1930. Operations were maintained ninety-eight per cent on schedule.

WILLIAM E. ARTHUR has been elected president of the National Airport Engineering Company, Ltd., of Los Angeles, Calif. He was formerly president of the William E. Arthur company and manager of the airport division of the Austin Company.

A 6,406-mile tour over the system of Western Air Express was recently completed by Herm Wilson, staff photographer for the company. The tour was made for the purpose of photographing views along the airways.



WILLIAM E. ARTHUR

Known as Pioneer Airport Designer, William E. Arthur planned several of the well known, modern airports in the United States, and has played an important part in the development of several others.

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BOEING SCHOOL OF AERONAUTICS

THE Boeing School of Aeronautics was established at the Oakland, California, Airport in 1929. The school has a Department of Commerce Approved School Certificate. The purpose of the Boeing school is to provide adequate facilities for flying and ground school instruction for the private plane owner, the student desiring training for commercial flying or preparation for entering the aeronautical industry as a trained mechanic, and for the man planning to prepare himself adequately for the responsibilities of the transport pilot. Its courses also provide instruction which is helpful to those planning to engage in the operating and executive sides of the industry.

The above paragraph, taken from the announcement of the Boeing School of Aeronautics, gives a general statement of the purposes back of the school which has attracted not only a substantial number of students but the interest of the industry, since the school is allied with the nationally known Boeing manufacturing and operating companies.

There are several features of the Boeing school which are interesting. For instance, the school has set certain educational requirements for admission; adopted a policy of refunding money to students who demonstrate inability to pass the examination creditably, although they may show sufficient ability to get a license; and included in the curriculum a number of necessary subjects which previously had been given only in university courses. From the start, emphasis was not laid merely on getting a pilot into the air and seeing how quickly he could learn to fly.

The Boeing school now has approximately 290 students. Some of these are taking only the extension courses of ground school subjects. Of the flying students, however, the majority are taking the advanced courses, evidence that these men are anxious to make aeronautics a career.

The five flight instructors, all of whom have had from 5,000 to 6,000 hours of flying, train students on five types of planes. The equipment includes Boeing trainers, a Stinson cabin plane, a Hamilton eight-place Wasp-powered all-metal cabin plane and one of the Boeing transcontinental mail-passenger planes. Students can also observe the flying of the trimotored Boeing transports which have their base in the adjoining hanger at the airport at Oakland.

Simultaneous with this instruction on the five types of airplanes, the students much keep up with their ground school instruction. There is enough machinery in the school shops to build an airplane, and engine instruction is given on Wasp Cyclone, Kinners, Axelson, Curtiss and Wright air-cooled engines and water-cooled types. Of the twenty-three instructors sixteen are in the ground school. These men realize that a flier is competent not merely when he can handle a plane, but when he knows the why and wherefore of it as well.

The courses in flight instruction are divided into three stages: the elementary, twenty-two hours, developing proficiency in taxying, take-offs, turns, spirals, banks, eights, slips, stalls, spins, regular and emergency cross-wind landings; the intermediate stage, thirty-three hours, a thorough review of maneuvers of the elementary stage, followed by instruction in advanced air work and acrobatics with emphasis on precision flying and landings in strange fields under emergency conditions, also instruction in three distinct types of planes, including a cabin plane; and the advanced stage, 145 hours, review of advanced air work of the intermediate stage, followed by instrument flying instruction in an eight-place cabin ship and in a Wasp-powered Boeing mail plane. Night landings and problems in air navigation and aerial surveyings are included in this curriculum. Students are given practice in flying the large planes with graded loads up to the rated capacity of the plane.

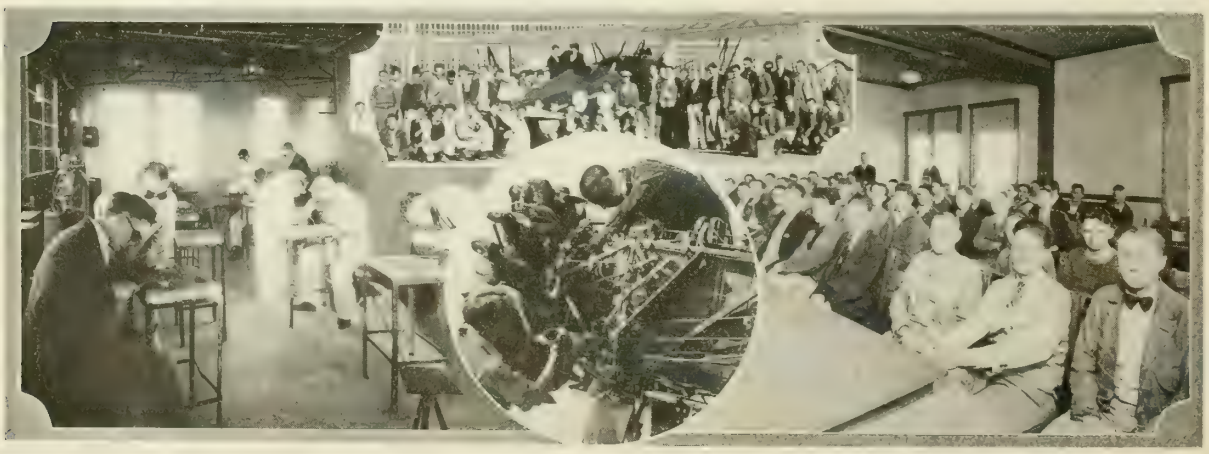
Of special interest is the master pilot course which includes 200 hours of flying and the master pilot ground school course of 924 hours on twenty-two ground school subjects deemed necessary for the master pilot. The flying equipment in this instruction includes Boeing and Stinson training planes, a Hamilton eight-place metal cabin plane, and a Boeing two-passenger mail plane of the type used on the transcontinental route.

Boeing flying instruction methods can perhaps be best described by tracing a student's progress through the various courses. His first dual instruction is given in a Boeing trainer, after which he graduates to a small enclosed plane. If he is after his transport pilot's license, he flies a three-ton Boeing mail-passenger plane after 100 hours' previous instruction. In the Hamilton job the pilot is sent up with sand loads of varying weights to become familiar with handling a plane under different load conditions such as are met in flying the air mail.

During the student's early dual instructions, he is taught to get in and out of spins. Occasionally the instructor cuts the switch and compels him to make forced landings. When the instructor is satisfied he has had sufficient dual instruction, the student solos and begins to perfect his take-offs and landings. Every attempt is checked by one of the instructors. Soon he is learning to do figure-eights and banks. If the flying instructor believes the student has the aptitude which will qualify him for a private license, that is recommended.

The Boeing School of Aeronautics has instituted a series of flying tests to keep checks on the progress of its students. Those taking the limited commercial course must pass the regular L.C. check, comparable to the Department of Commerce examination for a limited commercial license. In addition they must pass the following precision tests: twelve landings are made, three from a straight glide, three from a ninety-degree

(*Continued on next page*)



(Left) Ground school class in welding, forging, woodworking. (Center) Instruction on aircraft engines. (Upper) Boeing flight students. (Right) Students listening to a lecture on aviation

The RUSSELL "LOBE" is the ONLY PARACHUTE that



1 *Opens quickly & positively--without depending on springs, rubber bands, pilot chutes or other mechanical devices that may deteriorate or get out of order.....*

2 *Functions quickly without excessive opening shock load.....*

3 *Lets you down comfortably, at a slow rate of descent.....*

4 *Does not oscillate or sway during descent.....*

5 *Enables you to land gently---and squarely on your feet.*

THESE outstanding features are the direct result of proven patents covering the "Lobe" type of parachute and pack--controlled and developed exclusively by the Russell Parachute Company. Remember, there is only one "Lobe" type parachute.

That every detail of the design and construction in Russell Parachutes is time-tested and thoroughly tried is evidenced by the fact that--*The Russell "Lobe" Parachute has never failed to open in an emergency and bring its load safely to the earth.*

Naturally this modern aerial life-saver, made to meet modern aeronautical conditions, is a great favorite with transport companies, school officials and experienced flyers the world over.

» » » » There are more than 25 MEMBERS of THE RUSSELL CATERPILLER CLUB « « « « who owe their lives to the unfailing efficiency of Russell "Lobe" Parachutes. « « « « « « « « « «





Send for Descriptive Folder

THERE'S A CONVENIENT RUSSELL PARACHUTE PACK for every type of plane

In recent months Russell engineers have perfected a number of innovations for the convenience, comfort and safety of flyers. Notable among these is (A) The "quick-attachable" parachute pack and safety vest for use in cabin planes. With this equipment the passenger merely dons a loose-fitting, comfortable vest to which the parachute pack is quickly attached in case of emergency. (B) The new Russell seat pack with detachable back pad is also an interesting development. With this equipment you may always leave the parachute in the cockpit, fastening and unfastening the parachute harness while seated, just as you do with the safety belt. Other Russell packs are (C) the back pack, (D) the lap pack and (E) the training outfit consisting of two parachutes.

All Russell Parachutes are available in either silk, pongee silk or cotton materials. Prices range from $250 up. Send for descriptive folder and location of nearest Service Station.

RUSSELL PARACHUTE COMPANY

1202 Kettner Boulevard San Diego, California

Eastern Sales Office, 122 E. 42nd Street, New York

Service Station Managers Wanted

Russell Parachute Service Stations are being established throughout the United States. Experienced parachute service men are wanted. Write for our attractive proposition.

(*Continued from preceding page*)

turn and glide, three from a 180-degree turn and glide, and three from a 360-degree turn and glide. Three lines are drawn across the airport, the second line 200 feet from the first and the third 300 feet beyond the second, or 500 feet from the first. All twelve landings must be made within the first 200 feet and the plane must stop within the 500 feet. No slipping or "S"ing is allowed to kill speed or altitude.

The student is graded on his judgment, glide, actual landing, point of landing and roll. Ninety-four per cent is the highest grade and minimum passing grade is seventy.

All transport and master pilot students will be given this L.C. test within the fifty-hour training period. At the seventy-hour period of their training they must pass a closer check on flying maneuvers, corresponding to the transport test given by the Department of Commerce.

At the 100-hour period comes a more exacting precision test than that given the fifty-four hour student. The test consists of the twelve landings as in the previous test. The second line is 200 feet from the first, and the third line is 200 feet from the second, which makes the third line within 400 feet of the first. The landing must be made within the first 200 feet and the complete stop within the 400 feet. As in the first precision test, no slipping or "S"ing is allowed. The minimum passing grade is eighty per cent. After checking out on this test, the student is then ready to receive instruction in night flying and in the Boeing mail plane type 40-B.

In the instrument flying instruction, the student is covered up by a specially constructed hood with only his instruments to guide him, much the same type maneuver as Lieut. Jimmie Doolittle performed some months ago.

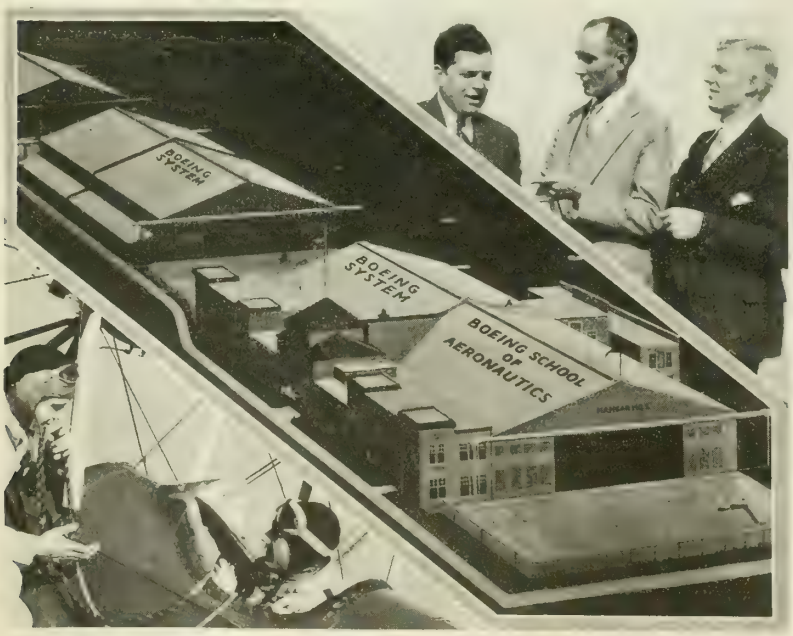
Another departure in training students is that the advanced pilot is competent to teach others to fly, and six hours of the flying time is devoted to reversing the instruction. The student corrects the experienced instructor, who intentionally climbs the plane too steeply or makes other errors.

Most of the flying students are more than willing and eager to coöperate with the instructors, especially in the matter of receiving new instruction. One of the instructors described to L. D. Ferguson, transport student, the art of making a loop and then told him to go up and do ten loops. Ferguson was gone for a long time. When he returned, the instructor asked him how he came out on the loops, to which Ferguson replied, "The first ten were not so good, but I improved somewhat toward the fortieth."

Only one-third of the Boeing students are fliers; the other two-thirds are taking mechanic or information courses designed to furnish specially trained men and women for important ground operations. That explains why the Boeing organization does not regard the fleet of nine airplanes as the most important part of the school, as some institutions regard flying equipment.

In addition to modern shop and laboratory equipment, there is a corps of specialized instructors and different schedules of classes. Although the Boeing school makes no employment guarantee for those enrolled, it is planning an employment program designed to put the graduates in touch with operators. It is the school's aim to keep the Boeing standard of training sufficiently high that various branches of the industry having need for the aeronautically trained will be interested in employing Boeing graduates.

"Flying schools have a responsibility in this respect that they cannot dodge," said George Myers, director of flying. Mr. Myers, who has 6,000 hours to his credit in the Army and transcontinental air mail, can contrast flying instruction of a decade ago with that of today; he believes that with faster, heavier and more maneuverable planes the qualifications of flying will be improved and certain students who had qualified a few years ago will soon not be given instruction by a responsible school.



(Upper Right) Boeing school executives (Left to Right) T. Lee, Jr., George Myers, H. F. Lusk. (Center) Hangar at Oakland Airport (Lower Left) Student, instructor changing positions for "instruction" by student

PREST SETS NEW SPEED RECORD

A NEW world's speed record was established May 28 at San Bernardino, Calif., by Clarence O. Prest, when he flew a 430-pound Prest Baby Pursuit over a fifty-kilometer course in thirty-six minutes, fifty-nine and four-tenths seconds. He maintained an average speed of 100.79 miles per hour.

Prest left the starting post at 10:53 a. m., flying at an altitude of approximately 400 feet. He kept a height between 400 and 700 feet during the first lap of the trip to the half-way mark, where he turned and flew back to the starting point.

The entire course is 62.4 miles in length and was surveyed for the event by County Surveyor Howard L. Way.

The plane used in the flight was designed by Prest and manufactured by the Prest Aeroplane Manufacturing Company of Arlington. It is a one-place ship and is powered with a three-cylinder engine.

The former record was held by Rene Pergret, who set the mark in Paris last year by making an average speed of 86.8 miles for the distance. The flight made by Prest was timed by Joe Nickret, official of the National Aeronautic Association.

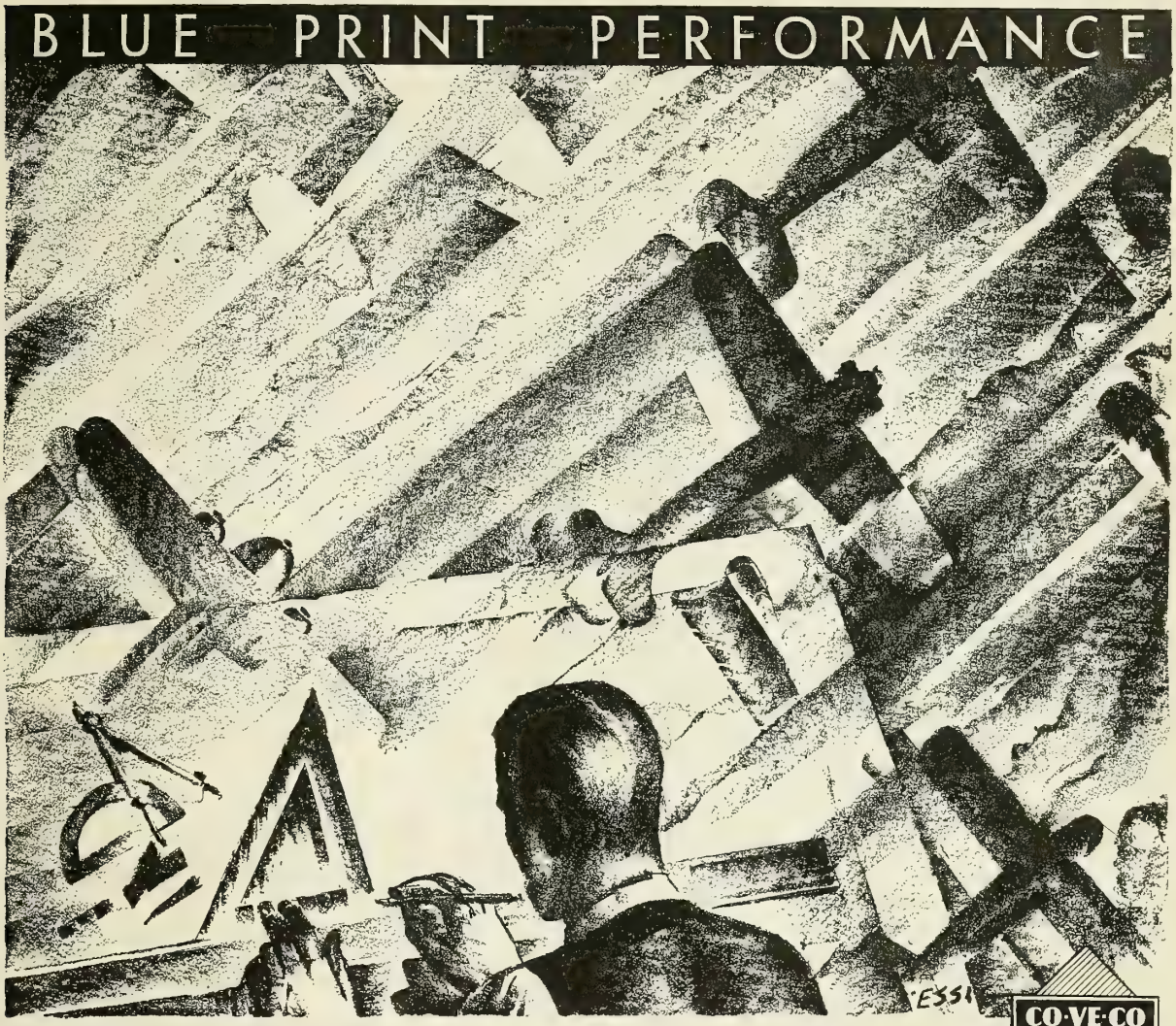
The weight of the plane is ten pounds under the maximum allowed for this class, 440 pounds. The ship has a span of twenty-four feet, one inch, and is eighteen feet long. Complete, it weighs 455 pounds, but much can be stripped off for speed purposes. The plane is designed to make thirty miles to the gallon of gasoline. An eight-gallon tank was used on the flight.

Students Enrolling in Standard Flying Schools Refunded Air Transportation Fare

FLYING students residing outside of Los Angeles and desiring to enroll at the Standard Flying Schools will be granted the privilege of flying from their home city to Los Angeles over the Western Air Express systems and affiliated lines without cost to them, according to a recent announcement of officials of W. A. E.

Under an arrangement effected between Standard and Western Air Express, students from Dallas, Tulsa, Kansas City, Cheyenne, Salt Lake City, and Seattle, including all way stops of W. A. E., West Coast Air Transport, and Mid-Continent Air Express, will be refunded the amount of their airline fare according to the course for which they enroll. Students who arrive at Los Angeles over any of these lines and enroll in the Standard Flying School for a transport course will be refunded their entire fare; those enrolling for a limited commercial

(*Continued on next page*)



Faithfully Maintained with CO-VE-CO

CO-VE-CO plywood has become an intregal part of aircraft performance. Its tremendous strength appeals, as does its durable, lasting qualities and its stubborn resistance to moisture absorption. Engineers realize that Co-Ve-Co can be economically manufuctured to their precision requirements direct from the log without steaming or cooking in any way. Thus each square inch is uniform in strength and quality...every fibre is intact. ▸The stamp of approval on Co-Ve-Co has not come from engineers and manufacturers alone, maintenance men are rebuilding planes with Co-Ve-Co using this plywood to repair wing ribs and spars or cabin floors and walls. They know that planes in which Co-Ve-Co is used serve owners well. ▸If you have not already done so, investigate Co-Ve-Co, *a superior plywood* made from Port Orford Cedar and Sitka Spruce.

PORT ORFORD CEDAR PRODUCTS COMPANY
MARSHFIELD, OREGON

***Exclusive Sales Representatives,* DANT & RUSSELL, INC., Portland, Oregon**

Southern California
CALIF. PANEL & VENEER CO.
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Los Angeles

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YOHO AND HOOKER
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H. B. MARIS PANEL CO.
735 3rd Street
San Francisco

(*Continued from preceding page*)
course will be refunded one-half of this cost; and students taking the private pilot course will be returned one-quarter of their fare.

Russell Parachute Company Will Establish Chain of Parachute Service Stations

NATIONAL expansion of the activities of the Russell Parachute Company of San Diego, Calif, to include the establishment of parachute servicing stations throughout the United States, was announced recently by H. R. McClintock, president of the company.

This expansion has been made as the result of the issuance by the Aeronautics Branch of the United States Department of Commerce of new regulations affecting the inspection and use of parachutes. These rules provide that parachutes be packed or repacked at least once every sixty days prior to being worn during flights in aircraft, all packing to be done by a parachute rigger, licensed by the Department of Commerce.

Four service parachute stations have been established by the Russell company. Others will be established at cities throughout the country within the next few months. W. T. Dodson, former chief parachute officer at the San Diego Naval Air Station, is supervisor of the parachute inspection station of the Russell company at the Grand Central Airport, Glendale. Walter Hall is in charge of the station at Oakland Airport; G. J. Duncan at Fairfax Airport, Kansas City; and Fred Cole at Roosevelt Field, New York.

The Russell company announced that it recently won a patent suit instituted by the Irving Airchute Company for alleged infringement of patents.

Los Angeles Metropolitan Airport Selected as Supply Base of Cirrus All-American Tour

THE Cirrus All-America Flying Derby, scheduled to start from Detroit, Mich., July 21, has selected the Los Angeles Metropolitan Airport as the Western control base, according to a recent announcement of Ray Cooper, secretary of the Detroit board of commerce. Mr. Cooper completed negotiations with Waldo D. Waterman, general manager of the airport, on an inspection tour of airports on the course of the derby.

As the most distant point from the start to finish, the Metropolitan Airport is designated as the repair and supply base. Lieut. Howard F. Murchie has been appointed official service head. A complete stock of parts and supplies will be installed. Maintenance and repairs during the only two-day stop on the race will be undertaken at this field.

Prize money offered, totaling $25,000, will be divided as follows: $15,000, first prize; $7,000, second, and $3,000, third. In addition to this sum there will be also $15,000 in lap money.

The American Cirrus Engines, Inc., is sponsoring this international race, open to all aircraft equipped with American Cirrus engines. The race is under the supervision of the National Aeronautic Association and the F. A. I. with local committees at each stop in charge. Larry Therekelsen, chairman of the contest committee of the local chapter of the N. A. A. will head the Los Angeles group, with Joe Nikrent as official timer and Earle Ovington, starter.

Leaving Detroit July 21, the derby is scheduled to make the following control stops en route to Los Angeles: Montreal, Canada, July 22; New York, July 22-23; Atlanta, Ga., July 23-24; Houston, Texas, July 24-25; Midland, Texas, July 25-26; Douglas, Ariz., July 26-27; Los Angeles, July 27-29.

Pacific Coast Aeronautical Exhibition Being Held June 28 to July 6

THE Pacific Coast Aeronautical Exhibition is being held at Oakland Airport, Oakland, Calif., June 28-July 6. The show is sanctioned by the Aeronautical Chamber of Commerce and the Oakland chamber of commerce, and is sponsored by the Oakland Post of the American Legion, and the Aero Club of Northern California, a chapter of the N. A. A.

Included in the program of events is a series of free lectures on aviation given by authorities and outlining a non-technical course in air transportation; aerial exhibitions, a display of aircraft, and other events.

ARRANGEMENTS have been completed by T.A.T.-Maddux Air Lines with various transportation organizations operating in Central California to provide improved service in both directions between Los Angeles, San Francisco and Yosemite Valley, according to an announcement by H. W. Beck, Western traffic manager. Formerly the journey required practically an entire day. Under the new schedule, the trip is made in less than half that much time, and will be in effect until September 1, only.

Passengers for Yosemite Valley leave San Francisco by air at 9:15 a.m., or from Los Angeles at 9:30 a.m., and make close rail connections in Fresno for Merced. From there, the Yosemite Transportation System motor stages will be used into the valley, via the Merced River canyon, arriving at the hotel and cabin settlement in the valley at 5 p.m.

On the return trip, passengers may leave Yosemite Valley via stage at 9 a.m., en route to Wawona, arriving in Fresno at 5 p.m. Southbound passengers leave Fresno via air at 6:05 p.m. and arrive at Los Angeles at 7:50 p.m. Northbound passengers leave Fresno via air at 6:20 p.m. and arrive at San Francisco at 7:40 p.m.



Packing Russell "Lobe" Parachute at plant of the Russell Parachute Co., located at San Diego

THE T.A.T.-Maddux Air Lines and the Pacific Steamship Company recently completed arrangements enabling steamship passengers between Los Angeles and Seattle to fly, if they so desire, between Los Angeles and San Francisco in either direction at slight additional cost over all water rates, according to a recent announcement of H. W. Beck, Western traffic manager.

CONTACTS

[F. E. SAMUELS]

CALIFORNIA AIR TRANSPORT recently moved into their new building, at the Los Angeles Municipal Airport. If there is any branch of student instruction for which Larry Talbot has not provided accommodation, we failed to find it. The equipment, both in the shops for the ground courses and on the field for flying instructions, is of the latest and best. Many types of ships are used for instruction of students, from the small sport plane to a large transport. The offices are fitted up luxuriantly, and the staff, under the personal direction of Larry, is courteous and painstaking. Marion E. McKeen, veteran pilot, is flying instructor.

WHILE on the subject of airports, we should mention the Los Angeles East Side Airport. For a privately owned airport this is one of our best situated ones, being directly on the highway to San Diego and just north of the city of Whittier. A four-way runway, enabling landings and take-offs in any direction, is as level as a floor. The port is controlled by the Whittier Airways Company, and is the base of operations of the Banks Aerial Service. Student instruction, cross-country flights and aerial taxi service, with modern equipment, make up a combination that is bringing satisfactory business to all concerned.

LOXLA C. THORNTON, known as the "armless pilot," reports the delivery of a Wasp-powered Bellanca cabin plane to Mr. W. O. Todd, oil drilling contractor. Mr. Todd bought the plane to be used for business and pleasure. He has a lodge 8,500 feet high in the mountains. To reach it requires a three-day journey with pack mules. The trip is made by plane in a little over three hours.

IN ONE day recently, thirteen graduate students of the Standard Flying Schools took license tests before Hugh Brewster, Department of Commerce inspector. In

(*Continued on next page*)

The CALIFORNIA AERIAL TRANSPORT SCHOOL

●

ANNOUNCES the moving into their new home on the 640-acre Los Angeles Airport, Inglewood, Calif. A building consisting of 19,000 square feet of floor space, including the finest equipment and classrooms, shops and students' quarters.

A flying equipment of seventeen modern airplanes.

●

THE CURRICULUM IS AS FOLLOWS:

COURSE No. 1

Primary Ground School Course (*not to exceed* 3 *months*)
1. History of Aviation
2. Aerodynamics (Theory of Flight)
3. Airplane Mechanics
4. Engine Mechanics
5. Air Commerce Regulations

PRICE, $30 PER MONTH; 3 MONTHS, $90

COURSE No. 2

Complete Ground School Course (*not to exceed* 6 *months*).
1. Thorough knowledge of subjects in Course No. 1
2. Meteorology
3. Navigation
4. Instruments
5. Parachutes

PRICE, $40 PER MONTH; 6 MONTHS, $240

COURSE No. 3

Master's Ground School Course (*not to exceed* 12 *months and includes Nos.* 1 *and* 2)
1. Ground Course No. 2
2. Radio Telephone
3. Wireless
4. Materials

PRICE, $50 PER MONTH; 12 MONTHS, $600

COURSE No. 4

Private Pilot's Flying Course (*not to exceed* 4 *months and includes No.* 1 *Ground Course*).

20 hours flying
Dual, 12 hours, primary ship (Fleets)
Solo, 8 hours, primary ships (Fleets)

PRICE, $475

COURSE No. 5

Limited Commercial Flying Course (*not to exceed* 6 *months and includes ground course Nos.* 1 *and* 2).

50 hours flying
Dual, 21 hours, primary ships (Fleets)
Dual, 3 hours, J-6 4-place Stinson-Detroiter
Dual, 1 hour, Whirlwind J-5 Travel Air
Solo, 21 hours, primary ships (Fleets)
Solo, 2 hours, J-6 4-place Stinson-Detroiter
Solo, 2 hours, Whirlwind J-5 Travel Air

PRICE, $1280

COURSE No. 6

Transport Pilot's Flying Course (*not to exceed* 18 *months and includes ground course Nos.* 1 *and* 2).

200 hours flying
Dual, 40 hours, primary ships (Fleets)
Dual, 1 hour night flying (Fleet)
Dual, 3 hours, J-6 4-place Stinson-Detroiter
Dual, 1 hour, Whirlwind J-5 Travel Air
Dual, 5 hours, J-5 Stinson Sr.
Solo, 120 hours, primary ships (Fleets)
Solo, 10 hours, J-6 4-place Stinson-Detroiter
Solo, 10 hours, Whirlwind J-5 Travel Air
Solo, 10 hours night flying (Fleet)

PRICE, $4150

CALIFORNIA AERIAL TRANSPORT

LOS ANGELES AIRPORT

INGLEWOOD, CAL.

●

(*Contacts continued*)

honor of the event a class dinner was given which over 100 undergraduate students of the Los Angeles school attended. Included in the class of thirteen, in which one transport, seven limited commercial, and five private graduates were represented, were the following: C. W. Schellbach, W. J. Tanahill, R. E. Daniels, W. H. Philips, R. E. House, O. F. Clark, Dr. J. H. Gahagan, A. L. England and C. K. Emery.

AT Midway City, just a few miles west of Santa Ana, is the plant of the Zenith Aircraft Company, where the original Albatross was designed and built. At a recent call at the plant, we were pleased to find that Mr. Price, president and principal owner, has been granted a Department of Commerce A. T. C. for the new six-place biplane, a combination mail and passenger ship. Work on a number of orders, already received, will start on the return of Mr. Price from the Northwest, where he is at present making a trip over that territory, using one of these ships.

THE return to Los Angeles of Harold Spear, pilot-salesman, is an item of news that will interest his many friends. In the days when Fisk started building the International airplane, Harold became sales manager for the organization. Harold went east with International and later joined Nicholas-Beazley at the Barling plant, where he has held forth for the past year and a half. Returning to Los Angeles, he brings with him the distributorship for the entire West Coast of the Barling planes, opening offices at the Nicholas-Beazley Los Angeles branch.

THE Emsco Aircraft Corporation has completed the construction of the Emsco Flying Wing, with which a trans-Pacific hop from Tokyo to Seattle will be attempted this summer. Final full load test flights will be made within the near future. At present, no performance data is available. The corporation is working on a high-wing monoplane with a fuel capacity of 1,000 gallons of gasoline. If the ship proves successful in lifting the load, a non-refueling endurance flight will be made, in addition to a long-distance record flight.

WHILE we were at Clover Field Airport recently, James Granger, distributor of the Swallow plane for the West Coast, informed us that while on a recent visit to the factory at Wichita, he had an opportunity to fly the new Special, powered by an Axelson engine. He spoke very highly of the performance of the plane and the smoothness of the engine. The Swallow Aircraft company has made a contract with the Axelson Aircraft Engine Company to use their engines exclusively in their new Special.

HOMER ROY WEBER, proprietor of the Spartan Field at Culver City, recently purchased an Evans Glider. He will give instructions in glider flying to the members of the Culver City Air Club, of which he is president.

CALIFORNIA

AIRTECH School of Aviation, Lindbergh Field, San Diego, Calif., has opened an additional school unit at the Imperial County Airport, Imperial, Calif., under the direction of Roy Pemberton, flight instructor. The unit is similar to the one the school operates at Palm Springs, Calif. Fleet training planes are used.

W. L. LEWIS, former chief engineer of the Solar Aircraft Company, San Diego, Calif., has resigned. He will devote his attention to the development of an all-metal plane. The Solar eight-place all-metal sesqui-plane was designed by Mr. Lewis.

A PENNY-A-POUND rate for passenger flights has been inaugurated by Airtech Flying Service, Ltd., Lindbergh Field, San Diego, Calif. The rate is for week-ends and holidays. The first week-end the system was adopted 224 rides were bought. Women and children pay one dollar each.

PRODUCTION of a new engine designated as the B-5, rated at 125 horsepower at 1,925 revolutions per minute, has been started by the Kinner Airplane and Motor Corporation of Glendale, Calif., according to a recent announcement of officials of the company. This engine recently passed the fifty-hour test run of the Department of Commerce and has been awarded Approved Type Certificate No. 51.

The Kinner B-5 is a development of the model K-5, 100-horsepower engine. Like Model K-5, the newer model is a five-cylinder, radial, air-coled power plant. Many of the parts of the B-5 are interchangeable with those of the K-5 and machinery now used in the production of the 100-horsepower engine will be used to produce the new engine with a small additional investment in jigs and fixtures.



Bert White, holder of world's altitude parachute record, 25,000 feet, established at Lancaster, May 25

AN ALTITUDE of 33,000 feet without reaching its ceiling was recently obtained by a Wasp-powered Boeing P-12. Capt. H. M. Elmendorff, Commanding Officer, 95th Pursuit Squadron, Rockwell Field, piloted the ship. At 33,000 feet the oxygen tube slipped from the officer's mouth and he immediately dove to lower levels to obtain sufficient oxygen to breathe. The previous altitude record of the Boeing fighter was 31,700 feet.

THE annual meeting of Pacific Air Transport of the Boeing System, Los Angeles-Seattle mail-passenger line, was held recently. The officers elected were as follows W. E. Boeing, chairman; P. G. Johnson, president; A. K. Humphries, vice-president; R. C. Bradshaw, secretary; and D. R. Drew, treasurer. The former board of directors was reelected.

A SUMMER school at the Oakland Airport, July 7 to August 8, will be operated by the Boeing School of Aeronautics to meet the demand of grade school and university teachers for instruction in aeronautics. Subjects to be taught were recommended by representatives of the teacher training institutions of California.

THE production units of the Bowlus Sailplane Company of San Diego, Calif., will be expanded, according to a recent announcement of officials of the company. A two-story factory building near the present factory at Lindbergh Field has been leased.

The original factory space occupied by Bowlus Sailplane Company is about 15,000 square feet. The new factory has an area of 11,520 square feet, making the factory space now occupied by this organization in excess of 26,000 square feet. The general offices of the company have been moved to the new location along with the raw material, stock room, metal and wood cutting departments, and rib, spar, and welding departments.

THE Pacific Technical University of San Diego, California, has completed the design and construction of pontoons to be used on an amphibion glider. The school was requested to design these pontoons by William VanDusen, transport pilot and San Diego Secretary of the N. A. A., for use on his initial flights with this type of equipment. The pontoons were designed, constructed and test-flown within two days from the time of receiving the order.

THE dedication of the Northern California flying school base of the Curtiss-Wright Flying Service was celebrated with a three-day program of aerial events at the organization's new airport at San Mateo, California, July 4-6. The airport is located a short distance from Mills Field, San Francisco's municipal airport. Facilities completed include a large hangar for the training planes, an administration building, a ground school building to handle classes of 100 students, living quarters for twenty, and complete lighting equipment. The airport covers 375 acres and has two cross-runways, 3,000 feet long by 100 feet wide.

THE Department of Commerce has awarded Approved Type Certificate 49 for the MacClatchie "Panther" developed by the MacClatchie Manufacturing Company of Compton, Calif., according to a recent announcement of J. Warren MacClatchie, president of the company.

The first section of a new $200,000 factory was recently completed and stocked with machinery for the manufacture of the power plant. The MacClatchie Panther is an L-head radial engine rated 150 horsepower at 1,900 revolutions per minute.

ALAMEDA

[H. V. WALDORF]

TWELVE students were graduated from the first special ground school course conducted by the Curtiss-Wright Flying service at the Montezuma School for Boys in the Santa Cruz mountains. Joseph F. Long, dean of the Curtiss-Wright ground schools in Northern California, conducted the class.

PRELIMINARY work on the $1,000,000 San Francisco Bay Airdrome on the west Alameda waterfront was completed July 1 and the flying field opened to air traffic. The airport is within five minutes' drive of downtown Oakland and seven minutes from downtown San Francisco by airplane ferry.

The initial work included the building of a hangar 440 feet by 120 feet, construction of paved runways, surfacing of the entire field, and installation of lighting equipment. The airport is 231 acres in extent. There is a runway 3,000 feet long and 400 feet wide, and a cross runway 1,700 by 200 feet. Asphalt strips for use in taxying adjoin the runways. The runways are of crushed oyster shell.

Companies to operate from the new airport include Western Air Express and West Coast Air Transport.

Glider demonstrations were given at the flying field May 25 by the Varney Air Service and the Mattley Aircraft company. The Varney organization demonstrated the Bowlus training glider; the Mattley company demonstrated the Mattley training type craft.

CHARLES HOBART BALDWIN, architect of Alameda and San Francisco, has designed an airport, which he declares is capable of handling in excess of 800 planes an hour. The airport is hexagonal in design and has four concrete runways, each 3,000 feet long and 100 feet wide. Baldwin has suggested the airport for China Basin, on the San Francisco waterfront, to serve as an air terminal for the entire San Francisco Bay region. The estimated cost is $30,000,000. The proposed site covers 320 acres of which 120 acres is submerged. Baldwin has submitted the design to the San Francisco board of supervisors.

NINETY business men, the entire membership of the Oakland Executives Association, recently took sight-seeing flights in Curtiss-Wright Flying Service planes at Alameda Airport. D. C. Warren, Curtiss-Wright distributor for Northern California and Nevada, was the principal speaker at the luncheon held by the club before the flight.

EIGHT of the General Electric Company's new type electric code beacons have been installed on the Suisin Bay bridge of the Southern Pacific Railroad. The beacons, of the non-rotating type, are used to outline the bridge to night fliers. The bridge is located about thirty miles north of Alameda Airport.

OAKLAND

[R. V. WALDORF]

DEVELOPMENTS of the Oakland-San Francisco airplane ferry service of the Air Ferries Ltd., during June included the establishment of a transbay messenger service, the introduction of commuation books, and completion of a traffic tie-up with the Pacific Greyhound motor bus lines.

The messenger service guarantees a direct delivery between the centers of Oakland and San Francisco in twenty minutes or less. The service is operated by the Air Ferries Ltd., and the Western Union, messenger boys meeting each plane.

In addition to the messenger service, the Air Ferries Ltd., announced a terminal-to-terminal parcel service.

The commutation books sell for $10 and $25, a ten per cent reduction over the regular rates. They were issued in response to requests by regular travelers on the service.

The tie-up with the motor bus line pro-

(*Continued on next page*)

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(California News continued)

vides for the interchange of passengers at Vallejo. By using Air Ferries Ltd., service from that point to San Francisco or Oakland, according to Joseph J. Tynan Jr., president of the company, passengers are saved more than two hours in trips to Sacramento Valley towns.

LIEUT. COL. LIVINGSTON IRVING of Oakland has started work on a series of crop dusting contracts in the Sacramento and San Joaquin valleys of California. He is using a Moreland biplane fitted with special dusting equipment. Robert Lavoy is associated with Colonel Irving in the work.

HANS KIRCHNER has organized the Scenic Skyway Company for the purpose of operating a taxi and sightseeing service in the vicinity of Lake Tahoe and the resorts of the Sierra Nevada mountains. The base will be established near Truckee and planes and flying boats will be used.

THE Oakland emergency air patrol has increased its membership to fourteen, according to a recent announcement of Maj. Roy MacDonald.

THE Naval Reserve Squadron at Oakland Municipal Airport will receive five new planes this summer, according to Lieut. Co. F. B. Connell, commanding officer.

NORTHWEST

[F. K. HASKELL]

JACK STURGIS of the Mamer Air Transport Company, Spokane, gave a lecture recently before the Chamber of Commerce of Pullman, Wash. He stated that aviation ranks seventh among the leading industries of the United States, and emphasized the importance of the fact that a ride of 120 miles an hour can be undertaken with the utmost safety. A movement has been started to develop an airport at Pullman.

THE seventh chapter of the National Aeronautical Association in the State of Washington will be installed at Kelso, Wash. The ceremonies will be supervised by Russell Lawson, vice president of the Portland chapter, and Thomas Stimson, governor of the Washington chapter. The officers of the Kelso chapter of the N. A. A. are as follows: Arthur F. V. Davis, president; Floid L. Hoggatt, vice president; John A. Pringle, secretary; and Dan Welch, Ray Blumner, Dr. Frank Davis, Edward J. Johnson, C. J. Morgan, George Norris and C. E. Fitz Maurice, directors. There are thirty-nine members in the club.

NEWTON WAKEFIELD, general manager of Mamer Air Transport has announced that the new air service between Spokane-St. Paul began operations on Monday, June 9. The final details of the inauguration were arranged at Billings, Mont., by M. A. Fuggy, general traffic manager of the company.

AS THE result of a report by William J. Mackenzie, airport inspector, the county airport at Yakima, Wash., will be improved and developed to meet the approval of the Department of Commerce.

UTAH

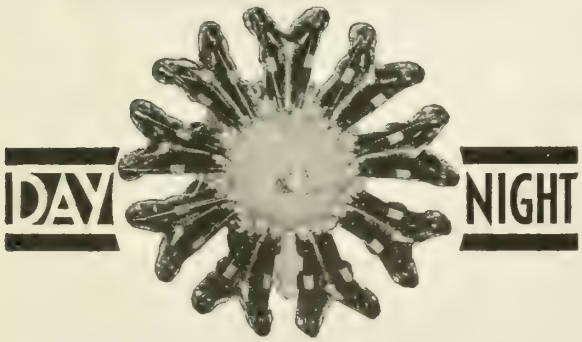
[G. PERRINS]

AN EXTENSIVE improvement program at the Airport Salt Lake is planned by Manager Gilbert T. Rich. Included in the improvements planned are the construction of an administration building, removal of wires to the east and south of the field and the provision of additional parking space. The administration building would contain offices for the mail hangars, a post-office, a consolidated ticket office, field administration offices and rest rooms.

NEARLY half of the 640,000 pounds of air mail handled during April by the twenty-five lines operating in the United States passed through Salt Lake, according to a report received here recently from Washington, D. C. A total of 290,988 pounds of mail was transported by the air mail lines operating out of Salt Lake, as follows: Boeing Air Transport Company, operating between San Francisco and Chicago, 190,521 pounds; Western Air Express, operating between Salt Lake and Los Angeles, 73,737

(Continued on next page)

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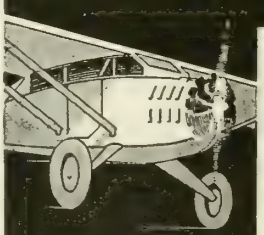
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(Utah News continued)

pounds; Varney Air line, operating between Salt Lake and Pasco, Washington, 23,251 pounds; and National Park Airways, operating between Salt Lake and Great Falls, Montana, 4,696 pounds.

TESTS were made recently at the Salt Lake airport by E. A. Westlake, of Seattle Boeing Air Transport company, preparatory to commencement of radio service between airplanes and ground stations. The voice control system of Western Air Express permits a two-way communication between pilots and Salt Lake officials for a distance of over 200 miles.

THE formal opening of Airport Payson at Payson, Utah, was observed recently. Members of the National Guard were present with artillery and took part in the parade. Floats were entered by local people. Governor George H. Dern dedicated the new airport. Airplane parachute drops and stunts were included in the program of events.

IMPROVEMENTS at Richfield's new airport are being completed and in the near future the field will be ready to accommodate planes.

A LARGE sign marking the Toole Airport from the air has been completed. Each letter is six feet long and painted white.

MEMBERS of the chamber of commerce of Hailey, Utah, recently conferred with Cowles Andrus of the Boise Flying service concerning the establishment of an airport. A committee was appointed to investigate and secure the best ground available for a field.

WASHINGTON

INSTALLATION of a chain of fourteen ground radio telephone stations in seven states has been completed by the Boeing System between San Francisco and Chicago. On June 1, all planes operated by the company west of Cheyenne were flown with the aid of radio telephone. On June 15, the entire line, which extends a distance of 1,943 miles, was equipped with this apparatus.

On June 1, the Boeing System completed the erection of ground stations in nine cities between Los Angeles and Seattle, a distance of 1,100 miles. A total of twenty-two ground stations and fifty planes have been equipped with apparatus for two-way voice communication.

THE Boeing "Monomail," a low-wing, all-metal monoplane powered with a Pratt and Whitney Hornet engine will be placed in regular service on the San Francisco-Chicago route for tests under operating conditions. The plane recently completed experimental flights.

CONSTRUCTION of twenty-seven Boeing F-4B2 single-place Wasp-powered Navy fighters has been started by the Boeing Airplane Company of Seattle, Wash. Delivery will be made in the spring. These planes are similar to those previously produced for the Navy and are equipped with the new Boeing engine ring cowling, new type landing gear and tail wheel. The F-4B2 is similar in general design to the ninety Army pursuit planes recently completed by the Boeing company.

[C. M. LITTLEJOHN]

VOTING to appropriate $10,000 additional, trustees of the Wenatchee chamber of commerce are to improve immediately the Fancher Flying Field of Wenatchee.

ERNEST CHRISTENSEN of Vancouver and Kelso, Wash., has established an aviation school at the Kelso, Wash., airport.

THE Triangle Airways was recently incorporated at Yakima, Wash., with capitalization of $10,000, to engage in the general business of transporting passengers, express, and mail by air, land, or water. The incorporators are H. H. Skinner, A. E. Kinuman and Elton W. Stephens.

A PROPOSAL to develop Boeing Field, municipal airport of Seattle, as an Army base has been approved by a citizens' advisory committee and the chamber of commerce. It is being urged that the base for the 489th Bombardment Squadron of the United States Air Corps Reserve be established there, and this matter is being taken up with officials of the War Department.

A NEW $3,000,000 airport for Seattle, in addition to the municipal airport already there, is planned by the Port of Seattle. Negotiations have been started with the War Department for approximately 1,000 acres of tideland near Fort Lawton. Col. George B. Lamping stressed the need for an adequate airport to care for travel which will come with the beginning of air transport travel between the Pacific Coast and the Far East.

ACCORDING to statistics recently compiled by officials of the Boeing Airplane Company of Seattle, the Army and Navy absorbed fifty per cent of the country's airplane production in 1926. In 1929 the service absorbed sixteen per cent of the production. During the past five years, according to the statistics, station stops on the air mail network increased from eighteen to 128, with a correspondingly larger number of states being served.

IDAHO

[I. M. DURNIN]

A FORCE of fifteen pilots are employed on the Salt Lake City to Portland route inaugurated by Varney Air Lines on May 14. Planes are flown between Boise and Salt Lake by J. M. Barnes, Stanley Compton, G. T. Douglas, Jack O'Brian and Ken Turner. Pilots on the Boise to Pasco trip are Art Davidson, H. L. Fey, L. Kay, J. P. Livermore and Roy Warner. Russel Owen flies the Pasco-to-Spokane route. Portland-to-Pasco pilots are Walt Case, Al Davis, H. Garbut and Dick Gleason.

THE Pocatello airport was lighted for night flying on June 1. The boundary lights, runway lights, and the beacons will be in operation continually during the darkness.

COLORADO

THE Denver Municipal Airport has been given an A-1 rating by the United States Department of Commerce, according to a recent announcement of officials of the airport. The field is used as a base of operations by Western Air Express. Equipment recently installed includes a hangar, a three-story administration building and a flood light. The airport is one mile long and one mile wide and is level and graded. The A-1 rating was awarded the field after a study and check of all data submitted, made by officials of the Department of Commerce.

[I. R. ALEXANDER]

CHARLES W. SHORT JR., of Tulsa, was in Denver recently making arrangements for a meeting of nearly 200 aviation experts to be held in Denver in July.

TWENTY officers and 100 enlisted men will take part in the training camp activities this year of the Forty-fifth Division Air Corps of the Colorado National Guard, to be conducted this month in Denver under the direction of Maj. Bruce Kistler at Lowry field. Preparations for the course of training have been completed. In connection with the plans for the camp, Lieut. W. E. Hujter and Sergt. H. M. Howell left Lowry Field for Laramie and other Wyoming towns to interest young men in that section in the training

GUNNISON, Colo., is soon to have an airport, according to P. C. Boyles, chairman of the joint committee from the various civic bodies of that city. A 200-acre tract has been obtained two miles south of the city and improvement work will begin at once. One 4,800-foot runway, running southeast and northwest, is to be completed first, and a 2,900-foot runway will be constructed later.

OFFICIALS of the Sterling, Colo., chamber of commerce went before the city council recently carrying the recommendation of the directors of the chamber that the city purchase 160 acres of land one-half mile north of Sterling, to be used as a municipal airport.

HARRY L. CATSS, auditor in Denver for the Western Air Express, has been transferred to Los Angeles, Calif., where he becomes assistant to the purchasing agent. He is succeeded in Denver by Fred O. Davis.

LESLIE FRAZEUR, for three years mechanic for Western Air Express in Denver, has been promoted to assistant division superintendent for Western Air and Mid-Continent in Denver. Capt. Charles W. France of Denver will continue as division superintendent.

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AERONAUTICAL INDUSTRY

THE PLACE TO MAKE AIRPLANE SALES

By Willis Parker

WHERE should the sales room of an aircraft distributor be located—at the field or in a downtown building? Likewise, where should the airplane display room be located—at the field or downtown? These are points that the distributor and dealer may well consider. It is a moot question, but we feel that the display and sales room should be located in a downtown section instead of at the flying field.

The principal objection to a display room downtown is based upon the size of the merchandise, which to be displayed adequately, would require a space of rather generous proportions, commanding fairly high rentals in comparison to the amount of goods that could be displayed in it.

We admit that the activities at an airport attract many visitors to it. Some of them are really interested in aviation to the extent of, sooner or later, becoming owners of planes or taking a flying course. Others go merely to be entertained. Nevertheless, if good "showmanship" is used, a downtown location attracts more visitors than the airport because there are more people passing daily than visit the airport; for airports are, in large communities, several miles removed from the business section. The crowds visit the airport on Sundays; they pass the downtown offices daily. When they join the Sunday throngs at the flying field, they are in a playful mood; when they pass the downtown offices they are in a more serious mood.

It is problematic whether or not the entertainment provided the Sunday visitors at the airport sells airplanes. A man may go to the circus and pay his dollar to see the elephants, etc., but he doesn't leave the circus lot with a desire to own an elephant. A man may take his family to the carnival and ride on the merry-go-round, but a desire to buy the merry-go-round is not aroused. Hence, it may be that we are overestimating the selling potentialities of the Sunday hops at $2.50 each. Just as in the case of the carnival and the circus, the airport visitor may buy a flight ticket, ride and leave the field without any desire to buy an airplane.

Before outlining the selling advantages in a downtown display room, let us consider additional bad features of the airport sales room.

We will assume that the prospect has reached such a point in his buying inclinations that the salesman considers it time to take him to the airport and show him the various models of planes. There he finds the ships lined up on the field in front of the hangar. The salesman opens his selling barrage and the situation is fast approaching the dotted line stage, when high in the air a pilot begins to do a few stunts, or a visiting pilot comes in for a landing, or another is preparing to take off. The prospect's attention is immediately drawn to the other activity, and though he may be listening apparently to what the salesman is saying, he really is watching the entertainment going on about him. The thread of the sales argument is broken.

There are so many angles to be considered in the purchase of an airplane, or a flying course, that there should not be any interference by outside interests while the sales effort is underway. Consequently, it is an advantage to be able to get the prospect away from distracting influences. This is possible in a downtown sales room.

By placing a small airplane on the sales floor, it is possible for the salesman not only to discuss the advisability of owning an airplane, but to illustrate his points on a full-size model. He can seat his prospect comfortably in sight of the plane and discuss the proposition without an interruption as is sometimes occasioned when a prospect drops into an aircraft company's downtown office, discusses the preliminary points relative to an airplane and then must be taken to the field for demonstration on the ground and in the air. Quite frequently the interval required to transport the visitor to the field is long enough to permit the prospect's enthusiasm to cool off.

We shall admit that, in cases in which a dealer is handling several models of airplanes, it might not be practical for him to rent a sales room of sufficient size to accommodate one of each model on the floor. But we must remember that the average initial purchase of a plane is going to be a small one; perhaps a two-place open-cockpit type. This is the model, or like the model, that may be shown on the sales floor. The larger planes may be at the field, for the purchaser of a transport plane, for example, probably already is sufficiently acquainted with aviation not to be distracted by the activities at the flying field. It is entirely a business proposition with him.

It is apparent, too, that the prospective flying student is much easier to handle in a downtown sales room than at the field, where his interest is divided between what the salesman is telling him and what the fliers are doing.

ELIMINATION BALLOON RACE POSTPONED UNTIL JULY 1

THE National Elimination Balloon Race, previously scheduled to start from Houston, Texas, June 10, has been postponed to July 4, according to an announcement of officials of the contest committee of the National Aeronautical Association. The postponement was made to permit the entry of three new contestants, and to allow Houston more time in which to secure an adequate supply of hydrogen gas. The event is sponsored by the National Balloon Race Corporation. Additional prize money of $400 will be awarded, increasing the total amount from $2,900 to $3,300. Prizes will be awarded from $1,000 for first place, to $100 for seventh.

The balloon representing the AERO DIGEST in the race will be piloted by Samuel Taylor Moore, Air Corps Reserve, and Lieut. Eareckson, aide. Lieut. Eareckson will replace Otto Wienecke, who was previously

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announced as aide of the AERO DIGEST balloon.

From the winners will be chosen the team to represent the United States in the International Gordon Bennett Balloon Race, scheduled to start from Cleveland, September 1. The contestants in the National Balloon Race will compete for the Litchfield Trophy, which the National Aeronautic Association awards annually to the winner of this event.

Lieut. T. G. W. Settle in the 1930 race will defend the Litchfield Trophy, which he won for the Navy in the race which started at Pittsburgh, Pa., in 1929. His victory last year took the trophy from the Army, which won it in 1928 through the victory of Capt. W. E. Kepner.

The three new entries increased the list of contestants from twelve to fifteen. The complete entry list for the 1930 balloon race is as follows:

United States Navy: Lt. T. G. W. Settle, pilot, and Lt. R. G. Mayer, aide; Lt. R. R. Dennett, Lt. C. F. Miller; Lt. W. Bushnell, and Lt. J. A. Greenwald. United States Army: Capt. Karl S. Axtater, Lt. Ralph E. Holmes; Lt. Walter D. Buie, Lt. John P. Kidwell; Lt. Wm. R. Turnbull, and Lt. Courtland M. Brown. Detroit Balloon Club: Svend A. U. Rasmussen, Tracy W. Southworth; Waldemar A. Klikoff, Roy S. Cunningham; Edward J. Hill, and Arthur G. Schlosser. Dr. Geo. M. LeGallee: Dr. Geo. M. LeGallee and Robert W. Ebert. United Van Service, Inc.: George Hineman and Milford Vanik, AERO DIGEST: Samuel Taylor Moore and Lt. Wm. O. Eareckson. H. E. Honeywell: H. E. Honeywell and aide, not named. Goodyear-Zeppelin Corporation: R. J. Blair and F. A. Trotter. Cleveland Chamber of Commerce: Pilot and aide not named.

Sergievsky Sets New World's Seaplane Altitude Record of 30,000 Feet With 500-Kilogram Load

A NEW world's altitude record of 30,000 feet for seaplanes carrying a load of 500 kilograms (1,102 pounds) was established June 15 at North Beach, Queens, L. I., by Boris Sergievsky, chief pilot of the Sikorsky Aviation Corporation. The record was established in a flight of about one and one-half hours, a temperature of twenty-five degrees below zero being encountered at the maximum altitude. A sealed barograph installed in the plane has been sent to Washington for official calibration.

The former world's altitude record of 27,749 feet for seaplanes of this class carrying a load of 500 kilograms was established November 2, 1928, by Fritz Harder of Germany.

Graf Zeppelin Returns to Germany

THE *Graf Zeppelin* landed at Friedrichshafen, Germany, June 6, completing an 18,000-mile journey to South America and the United States in a total of nineteen days, two hours and four minutes. The flight was made in a total of 298 hours of flying time at an average speed of about sixty miles per hour.

The crossing of the Atlantic ocean on the return journey from Lakehurt, N. J. was completed in sixty-two hours and fifteen minutes, the airship failing to equal the record which it previously established.

Adverse weather conditions were encountered on several legs of the flight which was made for the purpose of testing the feasibility of inaugurating regular airship service between Europe and South America, and of maintaining an approximate schedule under varying climatic conditions. The *Graf Zeppelin* is scheduled to make a number of voyages this summer.

ORVILLE WRIGHT was awarded the honorary degree of Doctor of Science by Ohio State University, Columbus, Ohio, at the annual commencement exercises June 16.

A FLIGHT from Montreal, Canada, to New York, a distance of 350 miles, was completed in one hour and fifty-five minutes, June 11, by Dale Jackson, holder of the world's refueling endurance record. Jackson took off from Montreal at 10 a. m., and landed at Curtiss Airport, Valley Stream, L. I., at 11:55 a. m., his average speed being approximately 190 miles per hour, or about 3.045 miles per minute. He used a Travel Air Mystery S and flew the entire distance at an altitude of about 1,000 feet due to poor visibility.

Committee Approves Design of Thompson Race Trophy Designed by Walter Sinz

THE design of the Charles E. Thompson race trophy has been selected by the committee appointed to make the approval. The model submitted by Walter Sinz, Cleveland sculptor, was chosen by F. Trubee Davison, assistant secretary of war for aeronautics; Clarence M. Young, assistant secretary of commerce for aeronautics; David S. Ingalls, assistant secretary of the Navy for aeronautics; and Orville Wright.

The trophy will be competed for on Labor Day for the first time, in conjunction with the National Air Races, Chicago, in an international free-for-all event, and will be awarded annually. Gold, silver and bronze plaques of the trophy will be given the first three pilots to finish the race, in addition to cash prizes, the trophy to be awarded to the nation, department of service or organization represented by the winning pilot. The sum of $10,000 has been appropriated for prize money for the First Thompson Trophy Race. The trophy will be about forty inches high and will be of silver and gold on a marble base.

THE *St. Louis Robin* has been purchased by the Gulf Refining Company and will be included in the Curtiss-Wright Exhibition which is scheduled to make a country-wide tour of airports this summer. The world's endurance record for continuous flight of seventeen days, twelve hours and twenty-one minutes was established at Lambert-St. Louis Field, St. Louis, Mo., July 30, 1929, by pilots Forest O'Brine and "Red" Jackson, with this ship.

LICENSING GLIDERS AND GLIDER PILOTS

REGULATIONS affecting glider pilots and gliders were announced recently by Clarence M. Young, assistant secretary of commerce for aeronautics. Three classes of pilot licenses — student, non-commercial and commercial — are provided for under amendments to the Air Commerce Regulations. Three classes of gliders will be considered eligible for license and will be licensed, according to the new regulations, upon satisfactorily completing an inspection by representatives of the Department of Commerce.

The Aeronautics Branch of the Department of Commerce has developed a policy designed to encourage the glider movement in the United States, licensing competent pilots and airworthy aircraft. A study, including a conference in Washington of the department's supervising and engineering inspectors, was undertaken by the department previous to promulgating the new regulations.

"In formulating a policy with respect to gliders and gliding," Mr. Young said, "the department has made a sincere effort to further the activity in all its phases. The department believes that the new regulations in no sense could be construed as having a tendency to curtail the manufacture or operation of gliders. Rather, they aim to provide for the elimination of probable sources of danger, which always will exist unless there is intelligent care and attention given to the construction, maintenance and operation thereof."

Under the new regulations affecting glider pilots, glider student permits, authorizing the holder to receive instruction and to solo licensed gliders under the supervision of a licensed glider pilot, will be issued by inspectors of the Department of Commerce divisional offices upon application. No physical or written examination will be required.

The non-commercial glider license will be issued to groups desirous of operating gliders for sport and pleasure. A flight test consisting of a minimum of three flights, including moderate banks in either direction, will be required for this license. There is no written examination. The commercial glider pilot license will be issued to all applicants physically qualified and successfully accomplishing the flight tests. Applicants are required to pass the physical examination required for the private airplane pilot's license. Applications for non-commercial glider licenses may be made on regular pilot application forms which may be obtained from department inspectors or divisional offices.

The flight test for the commercial glider pilot license includes a series of general and moderate banks, 360-degree turns and precision landings, in addition to normal take-offs and landings. Applications for the commercial glider pilot license may be ob-

(Continued on next page)



International Newsreel Photo

Clarence M. Young flying a primary glider at Washington, D. C.

(*Continued from preceding page*)

tained from department inspectors or divisional offices.

The three classes of gliders considered eligible for license by the Department of Commerce are as follows:

(1) Gliders manufactured under Approved Type Certificates, corresponding to the present procedure involving the licensing of airplanes built under Approved Type Certificates, and gliders constructed by anyone, provided they are built in accordance with specifications and designs which have been previously approved by the Department of Commerce. Gliders in the first group are those manufactured in quantities by holders of Approved Type Certificates for the type of gliders they are building. Such gliders shall be exactly similar in specifications, design and workmanship to the type approved by the Department of Commerce. Gliders under the second group are those manufactured by private owners or others who have followed previously approved specifications and design, provided the holder of the Approved Type Certificate sees fit to distribute such drawings.

(2) Gliders not manufactured under Approved Type Certificates but which meet the requirements for such a certificate. Gliders manufactured under this class are those which meet all of the minimum requirements for an Approved Type Certificate, but for which an A.T.C. is not desired because quantity production is not planned.

(3) Gliders not included in either class 1 or 2, considered eligible for license, provided they pass a visual inspection by the Department of Commerce as to design materials, workmanship, and flight characteristics, and provided they are manufactured prior to October 1, 1930. Gliders under this group include those built by individuals and clubs with or without previously approved designs. Their eligibility for license will be determined by a visual inspection of the design, materials, workmanship and flight characteristics, according to the method devised by the department. Gliders so constructed after October 1, will not be considered eligible for license.

THE Edward S. Evans American Duration Glider Prize has been withdrawn from the jurisdiction of the National Aeronautic Association by mutual agreement and the prize has been awarded to John C. Barstow and the Pacific Coast Gliders, Inc. The prize of $2,500 will be distributed, half to the pilot and half to the owners of the equipment, or $1,250 each.

Mr. Barstow took off on his unofficial world record flight of fifteen hours, thirteen minutes and thirty-one seconds at 12:44 p. m., April 29, from Point Loma, Calif., and landed on the field at 3:57:31 a. m. The flight cannot be recognized as official by the F. A. I., because the pilot did not carry a barograph.

Altitude of 3,400 Feet in Glider Flight

A FLIGHT of thirty-two minutes in which an altitude of 3,400 feet was reached and a distance of four miles from the starting point and return was covered, was completed in a secondary glider recently by John H. Livingston, president of the Midwest Airways Corporation of Aurora, Ill., according to a recent announcement of officials of the company. The flight was made over flat country thirty miles west of Chicago, the plane being launched into the air by towing behind an automobile. The glider was towed approximately 600 feet before cutting loose from the tow line.

THE Cape Cod Glider School, South Wellfleet, Mass., operated last summer by the American Motorless Aviation Corporation, reopened for its second season June 1. A preliminary period from May 16 until the opening date on June 1 was arranged for special instruction in soaring for licensed motor pilots.

The Cape Cod School was first opened for one month in September 1929, when seventy-three students were instructed in flying the three types of gliders. Permanent buildings, constructed in 1929 at a cost of $100,000, include the mess hall, work shop, two hangars, camp store, power and lighting plant. Electrically lighted tents with wood floors are provided for students. The school covers twenty-five acres on top of a bluff on the ocean side of the Cape.

Pres. Hoover Presents Collier Trophy to N. A. C. A.

PRESIDENT HOOVER formally presented on June 3, the Collier Trophy for 1929 to Dr. Joseph S. Ames, chairman of the National Advisory Committee for Aeronautics, who received the trophy in behalf of his organization. The Collier Trophy, donated by the late Robert J. Collier, is awarded annually by the National Aeronautic Association for "the greatest achievement in aviation in America, the value of which has been thoroughly demonstrated by actual use during the preceding year." It was awarded to the National Advisory Committee of Aeronautics for its contributions in the development of the N.A.C.A. cowling.

Changes in Personnel of Roosevelt and Curtiss Fields, Air Services, and Ireland Co.

SETH LOW has resigned as president of Roosevelt Field, Inc., to become chairman of the board of directors, according to a recent announcement. He has been succeeded by George Orr, general manager of the field.

George Ireland, founder and vice president in charge of sales of the Ireland Aircraft Corporation, has resigned and has been succeeded by M. M. Spencer, another vice president. Chief Pilot William Ulbrich also resigned.

William Lawless has resigned as general manager of Air Services, Inc., headed by William B. Leeds.

Frank Ambrose resigned as operations manager of Curtiss Airport, Valley Stream, L. I., and will be succeeded by Walter Avery. Mr. Ambrose said that he had no immediate plans except that he would take a vacation. William White has resigned as assistant operations manager at Curtiss Airport, and will join the staff of the Curtiss Exhibitions Company.

THE name of the Fokker Aircraft Corporation has been changed to the General Aviation Corporation and the capital shares of the company have been increased from 1,000,000 to 5,000,000, according to a recent announcement of officials of the company. Harris M. Hanshue, president of Western Air Express, is president of the General company.

A corporation known as the Dornier Corporation of America has been organized under the laws of Delaware, and it is expected that this company will become a wholly owned subsidiary of General Aviation Corporation. The new Dornier subsidiary company will employ the services of Dr. Dornier of Germany and expects to engage in the manufacture of new types of Dornier Flying Boats in the United States.

A NEW world's distance record for light airplanes over a closed circuit was established June 23 by Stanley C. Huffman of the Embry Riddle Company, Cincinnati, Ohio, in a flight of 1,271 miles in twenty-five hours and forty-two minutes. He carried fifty-five gallons of gasoline and used a standard Aeronca equipped with reserve tanks.

A NON-STOP flight of 2,300 miles from New York City to Mexico City, Mexico, was completed on June 21 by Col. Roberto Fierro in sixteen hours and thirty-five minutes. His flight is the first non-stop one from New York City to Mexico City. Col. Fierro took off from Roosevelt Field, L. I. at 2:29 a.m., June 21, and landed at Mexico City at 7:04 p.m., on the same day.

THE AIRCRAFT EXPORT MARKET

THE total value of aeronautical products exported by manufacturers in the United States during the first quarter of 1930 decreased $217,858 over the corresponding period in 1929, according to a recent announcement of Leighton W. Rogers, chief of the aeronautics trade division, Department of Commerce. There was an increase of approximately eight per cent in the value of aircraft parts exported. Aircraft parts was the only item in which there was an increase during this period.

The value of aeronautical exports during the first quarter of 1930 totaled $2,703,780, in comparison with $2,921,538 during the corresponding period the previous year.

"While the total sales decreased during this period," Mr. Rogers said, "export figures show that these countries are buying better planes, and that the total sales to individual countries has not decreased greatly. Sales to several countries amounted to a great deal more during the first quarter of 1930 than in the same period last year. Parts were sold to approximately fifty countries. In contrast to the increase in the export of aircraft parts, the sale of aircraft engines overseas showed a decrease of approximately forty-seven per cent.

"The fact that exports fell off indicates that the general condition of business throughout the world was responsible, and that overseas business will not come as easily this year as it did in 1929."

The total value of aircraft, aircraft engines, and parts exported during 1929 was $9,202,385. This sum is approximately three times greater than the exports made the previous year. In commenting on the increase in aeronautical export sales in 1929, Mr. Rogers stated orally on April 28, that all manufacturers of aircraft are not equipped to enter the foreign market. There are certain practices built up by experience which some manufacturers would not be in a position to adopt. He advised against entering the export market because business is bad at home and easing off or abandoning it when domestic business picks up.

The cause of failure of many export departments and companies in other industries has been because too often export matters have been turned over to clerical attention. Export problems are special ones and they require the best possible executive attention and ability.

In the report for the first quarter of this year, Mr. Rogers stated that the decrease in sales might be the result of a saturation of certain overseas markets, and that if the total export business is to increase materially, new markets must be developed.

THE first delivery in 1930 in Canada of Stinson planes equipped with pontoons was made in May, according to a recent announcement of William A. Mara, vice president of Stinson Aircraft Corporation. A six-place Stinson Detroiter powered with a 300-horsepower Wright Whirlwind engine has been delivered to the Yarrow Aircraft Corporation, Ltd., of Vancouver. A Stinson Junior was delivered to Henry Clerf of Seattle for use in Northern Ontario and British Columbia. Both planes are equipped with Edo pontoons.

Canada offers one of the Stinson company's best markets for 1930, according to Mr. Mara. During the past year, the company has conducted tests of Stinson planes equipped with pontoons preparatory to entering the Canadian market.

The company plans to establish a factory branch in Canada in the near future.

Creole Petroleum Corporation Using Sikorsky Amphibion in Survey in Venezuela

USING a Sikorsky amphibion, the Creole Petroleum Corporation is exploring and developing large unmapped areas in Venezuela. The plane is equipped with a Folmer Graflex K-5 aerial camera and a Fairchild F-4 aerial camera which are used to survey hundreds of square miles on a fair day. By studying the photographs it is possible to determine areas which appear favorable for further investigation by geological and geophysical methods.

The plane was flown to its base at Maturin last January for use in aerial survey work and the transportation of company officials, payrolls and materials. To travel from Maracaibo to Maturin by steamer, a distance of 700 miles, takes about ten days. The Sikorsky makes the trip in seven to eight hours. Many bodies of water are available for landing.



(Above) Unloading 300,000 Bolivars. (Below) Fueling Creole Sikorsky on Maracaibo Lake

J. F. WALLACE, chief engineer of the Cleveland Pneumatic Tool Company of Cleveland, Ohio, has sailed for Europe for a two months' tour. Mr. Wallace is the designer of the first pneumatic-shock-absorbing strut for aircraft, and the inventor of improvements in pneumatic-operated devices, including Cleco Gruss Air Spring for buses and trucks. At Berlin he will join L. W. Greve, active head of the company. They will visit manufacturers who are using Aerol struts as standard equipment, and inspect the principal aircraft factories and airports of nine countries.

SERVICES AWARD CONTRACTS FOR PLANES, ENGINES

CONTRACTS for aircraft, engines and parts aggregating approximately $9,000,000 have been awarded by the Army Air Corps and the Navy Department. Contracts for seaplanes and engines aggregating nearly $3,000,000 were awarded by the Navy Department, June 16, to the Wright Aeronautical Corporation, of Paterson, N. J., and the Detroit Aircraft Corporation of Detroit.

The contracts awarded to the Wright Corporation calls for 2,727 air-cooled Cyclone engines of 575 horsepower each, to be used in torpedo, bombing and patrol planes. The cost will be $2,030,930.90.

The Detroit Corporation will supply thirty-two amphibions powered with Wright Cyclone engines. The planes will be equipped with long-range radio sets.

The Army Air Corps is to get 402 new airplanes and 128 new engines and a supply of spare parts and accessories under contracts totaling $5,963,419, recently approved by Secretary Hurley. The funds for this equipment are available in the army appropriation bill for 1931, approved by President Hoover on May 28.

The largest contract was awarded the Douglas Company of Santa Monica, Calif., which will supply 146 Model BT-2-B training planes with spare parts and forty-four Model O-38 observation planes, with spare parts. The total cost of this equipment is $2,221,623.60.

The Boeing Airplane Company of Seattle, a subsidiary of the United Aircraft Company, received a contract to supply 131 Model P-12-C pursuit planes, with spare parts, at a cost of $1,543,183.90. The Thomas-Morse Aircraft Corporation of Buffalo contracted to supply seventy-one Model O-19-C observation planes, with spare parts, for $1,018,126.20.

The Sikorsky Aviation Corporation of Bridgeport, Conn., was awarded a contract for ten Sikorsky Amphibions and spare parts at a total cost of $437,832.65.

The contract for the 128 "Cyclone" air-cooled engines, model R-1750, with spare parts, amounting to $742,643.13, was awarded to the Wright Aeronautical Corporation, of Paterson, N. J., a subsidiary of the Curtis-Wright Company. All of the planes will be powered with the Pratt & Whitney air-cooled engines.

THE Mendel Medal, presented for distinguished service in the advancement of science, was awarded to Dr. Albert Francis Zahm, chief of the division of aeronautics in the Library of Congress, at the commencement exercises of Villanova College, June 5. Dr. Zahm made the first wind tunnel with precise measuring apparatus and invented three-torque control for airplanes; an airplane speed meter and shock recorder. He is the author of books on aerial navigation, aerodynamics and airplane stress analysis.

PARACHUTE TESTS FOR D. C. APPROVAL

REGULATIONS providing for the issuance of certificates of approval for parachutes have been promulgated by the Department of Commerce, according to an announcement made June 20 by Clarence M. Young, assistant secretary of commerce for aeronautics. The regulations become effective July 1.

The regulations provide for the issuance of certificates which denote approval by the Department of Commerce of parachute types that have met the minimum requirements of the department. These requirements are designed to ascertain the strength of the material of the parachute, rate of descent and promptness and certainty in opening.

Five tests will be required of each parachute type submitted to the Department of Commerce for approval. In the first test, the parachute will be required to open fully within three seconds after being dropped, carrying a dummy weighing 170 pounds from a plane flying seventy miles per hour at an altitude of 500 feet. The second test will be conducted under the same conditions, the suspension lines being twisted. The parachute must open fully within four and one-half seconds with all twists removed.

The third test, made to determine the strength of the parachute, will involve three drops with a 600-pound weight from a plane flying 100 miles per hour at an altitude of not more than 500 feet. Two live drops, made with a 170-pound man from an altitude of 2,000 feet, will constitute the fourth test. The fifth test, to determine the rate of descent, which shall not exceed twenty-one feet per second, will be made by dropping a parachute from an altitude of 2,500 feet with a 170-pound dummy.

The regulations require that parachutes approved by the Department of Commerce must be packed or repacked at least once in each sixty days before being worn in flights.

Regulations for Parachute Rigger's License

EFFECTIVE July 1, 1930, any person who packs, repairs or is charged with the inspection and maintenance of parachutes approved as to airworthiness by the Department of Commerce will be required to obtain from the Department of Commerce a Parachute Rigger's license, under a new regulation announced June 23. Only those who successfully pass examinations designed to test their capability of inspection, repairing, packing and otherwise properly caring for parachutes will be granted the Parachute Rigger's licenses.

THE Overcashier Monoplane produced by the Overcashier Aircraft Manufacturing Company of Detroit, Mich., has been approved by the Department of Commerce. The ship was designed and developed by Frank Overcashier, president of the company.

Mr. Overcashier has been identified with the aircraft industry since 1920. He was one of the first pioneers in the starting of flying schools. He is a transport pilot, holding transport license 1111.

In September, 1928, he formed the Overcashier Aircraft Manufacturing Company and devoted his entire time and energy toward the building of a ship. At the end of 1929, he started flight tests for the United States Department of Commerce.

AN honorary degree of Doctor of Science was conferred upon Glenn H. Curtiss at the Commencement exercises of the University of Miami, Coral Gables, Fla., June 9.

NATIONAL AERONAUTICAL LIBRARY

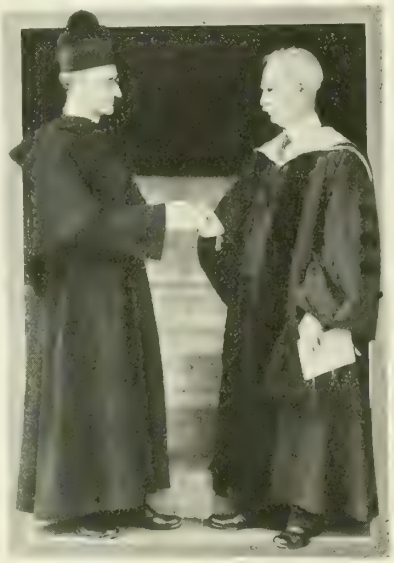
PREVIOUS to the establishment of the Division of Aeronautics of the Library of Congress, there had been a long-felt need for a national establishment in which was centralized the ancient and rapidly increasing current literature on aeronautics; both in the interests of students and of active technical men engaged in the scientific production, operation and regulation of aircraft. Various branches of the Government had assembled independent libraries, including the Smithsonian Institution, the Department of Commerce, the Army, the Navy, and the National Advisory Committee for Aeronautics. In addition, there were available several private collections.

There was a need for a comprehensive collection of aeronautic literature combined with a personnel not only competent to develop it but to interpret it and aid serious readers in its effective use. Realization of the service which such an institution would perform resulted in the offer of the Guggenheim Fund for the Promotion of Aeronautics to form at the Library of Congress an aeronautical collection which eventually might become "the most important library in this country and perhaps even in the world."

The offer of the Guggenheim Fund was accepted, and following a series of conferences and discussions between Dr. Putnam and representatives of the Fund, concerning the organization of the aeronautical library, a grant of $140,000 was made for this purpose. The grant was to be divided as follows: $75,000 for the endowment at the Library of Congress of a chair of aeronautics; and $51,000, for the acquisition of material.

It was agreed that "only a specialist well grounded in the science and familiar with the research in it, and also with the understanding of the operations involved in it as an art, which will enable him to keep in touch with such operations, in intelligent relations with those conducting them, can

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Rev. Joseph Hickey presenting Mendel Medal to Dr. Zahm at Villanova College

SYMPOSIUM ON AIRCRAFT MATERIALS

THE Symposium on Aircraft Materials was held at the annual meeting of the American Society for Testing Materials at Haddon Hall, Atlantic City, N. J., June 27. A group of seventeen papers on the various properties of aircraft materials were presented.

The papers presented at the Symposium were as follows: Ferrous Metals Used in Airplane Construction, J. B. Johnson; Structural and Engineering Light Alloys for Aircraft, R. L. Templin, F. V. Hartman and E. C. Hartman; The Highly-Alloyed Steels in Aircraft Construction, Jerome Strauss; Strength and Characteristics of Wood Used in Aircraft Construction, G. W. Trayer; Aeronautical Textiles, W. E. Emley; Corrosion-Prevention Methods as Applied in Aircraft Construction, H. S. Rawdon; Notes on Aircraft Finishes, H. A. Gardner; Applications of Stampings, Forgings and Castings in Aircraft Construction, H. G. Runde; Materials of Construction in Aircraft Engines, R. R. Moore; Failures of Aircraft Engine Parts and Causes Thereof, T. T. Neill; Specifications and Materials Control, H. A. Backus; Mechanical Testing of Aircraft Materials, J. B. Johnson; Metal Joints in Aircraft Construction, T. W. Downes; Procedure Control in Aircraft Welding, H. L. Whittemore. J. J. Crowe, and H. H. Moss; X-ray Testing of Aircraft Materials, Ancel St. John; Photo-Elastic Studies of Aircraft Parts, T. H. Frost; and Heat Treatment of Aircraft Parts, H. C. Knerr.

The development of this group of papers

(*Continued on next page*)

was the result of the coöperation of a committee advisory to the Society's committee on papers and publications. The members of the committee were as follows:

H. C. Knerr, chairman, Dr. R. S. Archer, H. A. Backus, J. B. Johnson, Dr. Alexander Klemin, Dr. G. W. Lewis, Dr. J. A. Mathews, R. R. Moore, Dr. J. S. Newell, Dr. H. S. Rawdon, Capt. H. C. Richardson, E. P. Warner, Comm. R. D. Weyerbacher, H. L. Whittemore, T. P. Wright, and Clarence E. Young.

New All-Metal Plane Being Built at Kansas City

A NEW design of low-wing monoplane is nearing completion at Kansas City, Mo., under the direction of Jack E. Foster, designer, formerly chief engineer of the American Eagle Aircraft Corp., and Dr. Walter M. Cross, well known aircraft enthusiast, also of Kansas City.

The outstanding feature of the new design is the semi-monocoque stressed skin cantilever wing. The wing construction is covered by basic patents controlled by the builders. No spars are used in the wing, the double thickness skin being designed to handle all bending, shear and torsional loads. The double skin is prepared for application in strip sections approximately one foot wide, corrugated and blanked to desired form in dies used in a punch press The construction is handled entirely on a sectional basis, the root of the wing being used as the starting point and the sections added progressively towards the tip. Metal ribs are placed at the points where the sections join and these ribs constitute the only internal framing of the entire wing. The outer covering is perfectly smooth and free from corrugations of any kind.

Mr. Foster reports his present construction to have advantages over the standard spar type of metal wing, including extreme lightness and freedom from flutter due to torsional loads.

The wing assembly has been static tested to the required factor of safety with a deflection of two inches on the wing tip. After the load had been removed the structure returned to its original form without having taken any permanent set.

The plane now under construction is of the two-place type with full cantilever control surfaces. It is planned to use a Pratt & Whitney Wasp Junior power plant. Other designs are being contemplated, using the same basic principles of construction.

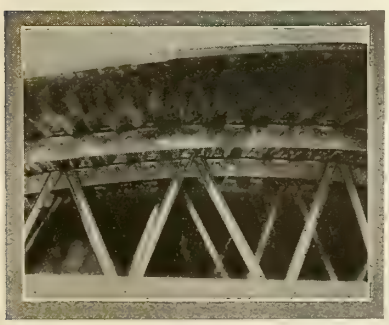


Photo Showing Details of Metal Wing Construction of Foster-Cross Plane

COMING AERONAUTICAL EVENTS

June 30-July 1. Third National Model League of America Contests, Detroit, Mich., auspices *American Boy Magazine.*

July 3-5. Western States Aeronautical Conference, Medford, Oregon.

July 4-6. Air Meet, Lake Placid Airport, N. Y., auspices Lake Placid Flying Services, Ltd.

July 4-6. Dedication of municipal airport, Charleston, W. Va., auspices West Virginia Airways, Inc.

July 4. Dedication of Kelso, Wash., municipal airport.

July 4. National Elimination Balloon Race, starting at Houston, Texas.

July 6. Beginning of International Transportation Exposition, Poland.

July 10-19. Second Annual Michigan Air Tour, auspices Pontiac Board of Commerce.

July 20. Start of "Challenge de Tourisme Internationale" from Berlin-Tempelhof Airport, Berlin, Germany.

July 21. Start of All America Fyling Derby for American Cirrus powered planes from Detroit, Mich. Sponsored by American Cirrus Engines, Inc.

August 8-17. Great Lakes Air Cruise, auspices Detroit Flying Club.

August 9-10 Colorado Springs Air Meet and Tour, auspices Colorado Springs Chamber of Commerce, Colorado Springs, Colo.

August 9-24. International Gliding Meet, auspices Rhoen-Rossiten Gesellschaft, East Prussia, Germany.

August 18-20. National Air Parley, sponsored by the Air Law Institute, Chicago, Ill.

August 23-September 1. National Air Races, Chicago, Ill.

August 30-September 1. Dedication of the Williamson-Johnson Airport, Duluth, Minn. Postponed from July 4-6.

September 1. James Gordon Bennett Balloon Race, Cleveland, Ohio.

September 1. First Annual Thompson Trophy Race, Chicago, Ill.

September 1-4. Sioux Falls Airfair, Soo Skyways Airport, Sioux Falls, S.D. Sanctioned by N. A. A.

September 1-6. Fifth International Air Congress, The Hague, Holland.

November 27-December 14. Aeronautical Salon, Paris, France.

December 10-23. International Congress of Aerial Security, Paris, France.

National Clearing Houses of Aviation Reports Proposed by Purchasing Agents

PROPOSAL of national clearing houses of reports and findings of scientific and engineering groups and of technical and purchasing groups in the aviation industry, was made at the annual convention of the National Association of Purchasing Agents held recently at Chicago, Ill. E. Van Vechten, of National Air Transport, proposed the scientific and engineering information clearing house for aviation. He suggested that a method be developed for gathering such information in order to make it available for distribution to the aeronautical industry.

Mr. Van Vechten proposed prices on purchase of plane parts and accessories based on yearly figures rather than on day-to-day purchases, and legislation to reduce present freight rates on shipments of airplanes and airplane engines to the level of first class freight.

Flight Commemorating Twentieth Anniversary of Glenn H. Curtiss Albany-New York Flight in 1910

IN COMMEMORATION of the twentieth anniversary of the Albany-New York flight made by Glenn H. Curtiss in 1910, a group of seven planes retraced the course of the trip on Decoration Day, May 30. Mr. Curtiss accompanied the detachment of planes in a Curtiss Condor. The flight May 30 was completed in one hour and twenty minutes as compared with two hours and thirty-two minutes required for the journey in 1910. The commemorative event was sponsored by the Aeronautical Chamber of Commerce and the chambers of commerce of New York City and Albany. The ceremonies at Albany included a luncheon in honor of Mr. Curtiss.

Sixteen guests made the trip in the plane with Mr. Curtiss, who took over the controls on part of the journey from Capt. Frank Courtney, pilot.

The personnel of the anniversary flight included the following: Mrs. Glenn H. Curtiss and Glenn H. Curtiss, Jr., Jacob Ten Eyck, official starter of the 1910 flight; Lieut. McClellan; Mayor John Thatcher of Albany; William E. Fitzsimmons, of the Albany Chamber of Commerce; Peter J. Brady, head of New York City's committee on aviation George F. MacLaughlin, editor of AERO DIGEST; and officials of the Curtiss-Wright Corporation.

Officials participating in the ceremonies at Albany included Lieutenant Governor Herbert H. Lehman, and Senator Webb, of the New York State aviation committee.

Brock and Schlee Complete Coast-to-Coast Flight

A TRANSCONTINENTAL flight and return from Jacksonville, Fla., to San Diego, Calif., and return, was completed June 18 by William S. Brock and Edward S. Schlee in a total flying time of thirty hours, forty-four minutes and thirty seconds, and a total elapsed time of thirty-one hours and fifty-seven minutes. Brock and Schlee took off from the Jacksonville Municipal Airport at dawn June 17 on a contemplated thirty-hour flight to San Diego and return. They landed at Jacksonville sixteen hours and fifty minutes after leaving San Diego, stopping en route at Tullulah, La., to take on fifty gallons of fuel.

NEW YORK

PLANS for the inauguration this fall of an Airplane Extension Course by New York University were announced recently by Dr. John W. Withers, dean of the School of Education, New York University. The project calls for the transportation of New York University professors at regular intervals to a number of towns in New York, Massachusetts, Delaware and Maryland, where educational instruction will be given to teachers in grade schools, high schools and similar institutions.

New York State Air Tour Scheduled July 14-19

AN AERIAL tour of New York State will be held July 14-19, starting and ending at Buffalo, N. Y., according to a recent announcement by State Senator J. Griswold Webb, chairman of the New York State Aviation Commission, sponsor of the tour in conjunction with the National Aeronautic Association.

The flight will head east from Buffalo, cover Central New York, then down the Hudson Valley and west over the South part of the State to Buffalo. More than thirty planes will participate.

Awards and trophies will be given the cities in New York State which have done most to safeguard flight at their airports, and those which have shown the greatest progress in general air facilities.

The advisory board for the tour includes F. Trubee Davison, Assistant Secretary of War for Aeronautics; Senator Webb, Assemblyman Herbert B. Shonk, vice president of the State Aviation Commission; H. Ralph Badger of Buffalo, State governor of the National Aeronautic Association; and William P. Capes, secretary of the New York State conference of Mayors and city officials.

The tentative schedule is as follows:

July 14, start Buffalo; Niagara Falls, luncheon; Rochester, over night.

July 15, Syracuse, luncheon; Utica, night.

July 16, Schenectady, luncheon; Albany, night.

July 17, Poughkeepsie, luncheon; Binghamton, night.

July 18, Elmira, luncheon; Hammondsport, night.

July 19, Leroy, luncheon; end flight at Buffalo.

A GLIDER meet known as the American Legion Celebration and Rodeo will be held at Norwich, N. Y., July 4-5. The events will include a spot landing contest and a duration competition. Prizes totaling $700 have been posted.

In the spot landing contests, the first prize is $125; second, $50; and third, $25. Launching must be by means of the shock cord method only, and each competitor will be allowed two trials.

A prize of $500 will be awarded to the winner of the duration contest, a minimum flight of two hours being required for eligibility for the prize. The take-off will be from a hill and the landing in front of the grandstand. This contest is open to first class glider pilots or by invitation, in secondary gliders and soarers. Only one prize will be awarded. If more than one contestant exceeds a flight of two hours, the one remaining aloft the longest time will receive the award.

MALCOLM R. WHITE was elected president and chairman of the board of directors of the American Motorless Aviation Corporation at the annual stockholders' meeting of that company held recently. Mr. White is a member of the board of directors of the Colonial Airways System. Einar Braathen was elected a member of the board of directors and executive vice president of the company. Maj. Vergne Chappelle, president of the Brooklyn Flying Club, was elected vice president.

Directors of the company elected at the meeting are as follows: Maj. General John F. O'Ryan, vice president of The Aviation Corporation and president of Colonial Airways System; R. M. Atwater, Jr., Clarence E. Doll, Howard Coonley of Boston, and William B. Mayo of Detroit, president and director of National Glider Association and chief engineer of the Ford Motor Company.

THE Marquette League of New York City has placed an order with the Bellanca Aircraft Corporation, New Castle, Del., for a Bellanca Pacemaker, a six-place cabin monoplane powered with a Packard Diesel 225-horsepower engine. The ship will be used for missionary work in Alaska. Brother George J. Feltes, S.J., will pilot the ship.

A FAIRCHILD KR-21 taper wing biplane has been made available for use of employees by the Fairchild Airplane Manufacturing Corporation of Farmingdale, L. I., for the purpose of permitting employees with pilots' licenses to keep up on their flying time, and to obtain an engineering, operations and performance record of the plane.

Under the plan adopted by the company, employees holding pilots' licenses may keep up their air time on the KR-21 at a small price covering the cost of fuel and insurance. Complete records will be kept of the plane's performance.

KARL E. VOELTER has been appointed Southern manager of the Curtiss-Wright Flying Service with headquarters in Miami, Florida, according to a recent announcement of Maj. E. H. Brainard, general operations manager of the company. Mr. Voelter was formerly sales promotion manager of the company.

THE New York offices of the International Derrick and Equipment Company of Columbus, Ohio, have been moved to the Brady Building, 90 West Street, New York City, according to a recent announcement of A. L. Worack, district manager.

A BARLING NB-3 Flying Club has been formed at Barren Island Airport, Brooklyn, N. Y., with fifteen members. The club was formed for the purpose of helping students to fly at a moderate rate of cost. Gorman Brothers will supervise the club. All inquiries concerning the club should be addressed to Gorman Brothers, 2259 59th Street, Brooklyn, N. Y.

THE annual report of Fairchild Aviation Corporation, manufacturing division of the Aviation Corporation, recently announced by Sherman M. Fairchild, chairman of the board of directors, showed sales for 1929 of $3,494,356.60 compared with $2,656,560.12 for the previous year. This represents an increase of $837,796.48 or more than thirty-one per cent in sales by the Fairchild company.

THE Bendix Aviation Corporation of New York has purchased the Charles Cory & Son Corporation, marine equipment, according to a recent announcement by A. P. Homer, under whose management the concern will be operated as a division of the Bendix Corporation. Subsidiaries of the Bendix company include the Pioneer Instrument Company, Bendix Brake Company, Eclipse Aviation Corporation, Eclipse Machine Company, Bendix Stromberg Carburetor Company, the Scintilla Magneto Company, and the Bendix-Westinghouse Automotive Air Brake Company.

AT A RECENT meeting of the board of directors of the Chicago Pneumatic Tool Company of New York, W. L. Lewis, formerly assistant comptroller of Bethlehem Steel Corporation, was elected vice president, secretary and treasurer of the Chicago company. He succeeds J. G. Grimshaw, secretary and treasurer, resigned.

CENTRAL NEW YORK

[M.MARVIN]

TWO transport pilots have made arrangements to use a field which adjoins an emergency landing field, between Herkimer and Little Falls, when barnstorming in that section.

MARTIN SCHEMPP, instructor for the Syracuse Glider Club, gave a glider demonstration to the cadets at the Manlius School recently. Lieut. H. A. Reynolds of the glider club made arrangements for the demonstration with Col. Guido F. Verbeck, superintendent of Manlius. Mr. Schempp used a glider made by the Alexander Aircraft Corporation, of Denver, Colorado.

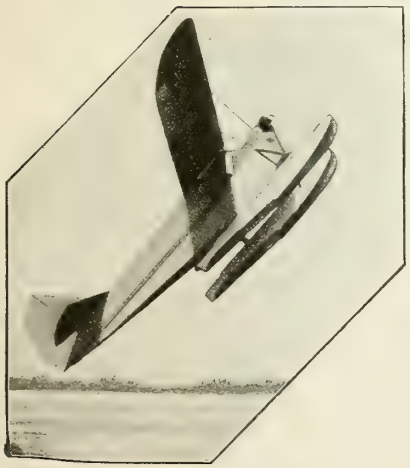
EMIL ROTH, JR., has leased one-half of the municipal hangar at the Amboy-Syracuse Airport for Empire Air Transport, Inc. Mr. Roth said that Empire needed additional hangar space to extend its operation. Ships stored in the municipal hangar will be operated at the municipal airport and the company will pay the city operating fees on those ships. The Empire company has received three new Waco biplanes and a New Standard four-place biplane.

MEMBERS of Syracuse University's class in aerial photography use a Ryan monoplane operated by Eastern Aeronautical Corporation when doing practical work. J. Nelson Frey of Eastern and Al Brooks assist Prof. Earl Church of the University in conducting the field work in the course.

(Continued on next page)



PONTOONS....



In actual tests the Ford Trimotor, 5 A T, equipped with Pontoons designed and built by the Aircraft Products Corporation, and fully loaded to 13,500 lbs., left the water in fifteen seconds. And, due to the careful streamlining of these Pontoons, its air speed was retarded only five miles per hour. The little Aeronca gets off the water in ten seconds and its top speed is retarded only three miles per hour.

on the Giant 1275 H.P. Ford Trimotor or the 30 H.P. Aeronca . . . Superior Performance Reflects Better Engineering

The relative performance of your ship on Pontoons is dependent entirely upon the engineering ability of the Pontoon Designers.

Our engineering staff is composed of carefully selected specialists whose experience and past achievements place them among the leading authorities in their respective fields.

Aircraft manufacturers can safely turn their Pontoon problems over to Aircraft Products Corporation, and rest assured that these specialists will produce Pontoons particularly adapted to their individual type of ship . . . Pontoons that will provide maximum performance in getting off the water, and minimum head resistance in flight. You are invited to discuss your Pontoon problems with our engineering staff.

AIRCRAFT PRODUCTS CORPORATION OF AMERICA
Detroit, Michigan

Aircraft Products
CORPORATION
OF AMERICA

(New York News continued)

Eastern has the contract for making aerial pictures for the University course.

Mr. Frey and Mr. Brooks have made a strip map of the city of Syracuse from the postoffice in Clinton Square to the municipal airport. The University's aerial camera was built by Gustay Deyde in Germany.

THE Sylvan Beach Airport was recently dedicated at Sylvan Beach, N. Y. The field was developed by Howard Beneke.

THE new Syracuse Glider Airport on the main highway near Pompey was recently opened. Exhibition flights by Martin Schempp, German glider expert and instructor of the Syracuse Glider Club, his brother, Reinhold Schempp, and other members of the Syracuse Club, were made. Mr. Martin Schempp and Lieut. T. A. Raynolds, author of numerous articles on gliding and glider construction, aided the members of the club in selecting the new permanent field.

Terrain in the vicinty of the new field is suitable for either training or soaring flight. Mr. Schempp used his new Alexander steel fuselage training glider in the exhibition flights. The training system developed by Hawley Bowlus will be used at the Syracuse Glider Airport. Mr. Bowlus has outlined a definite course of instruction for students of the Syracuse Club. Classes will be held, weather permitting, each Sunday. The glider club will form junior groups comprised of girls and boys fourteen years of age and over.

ANNOUNCEMENT was made recently by Robert C. Hayes, president of Hayes Aviation, Inc., of plans for the opening of a glider school at Hayes Airport, Cicero. Instruction will start when two Bowlus Gliders ordered from the Bowlus Sailplane Company of San Diego, Calif., have been delivered. Hayes Aviation has been appointed Central New York distributor for the Bowlus company.

BUFFALO

[A. SHEPHERD]

A GROUP of Buffalo citizens were guests of the chamber of commerce recently on airplane tours of the Niagara region. Several trips were made in a Ford trimotor operated by the Sky View Lines, Inc. The tour commenced at Lackawanna and followed a sixty-mile course extending to a point below the Falls.

OPERATION of night sight-seeing planes over Buffalo and vicinity was inaugurated recently by Charles Dallas, Inc. The company is located at the Buffalo Municipal Airport.

PLANS for a seaplane base at Buffalo have been approved and bids will be opened early in July. A resolution favoring the purchase of a six-tank foam type chemical engine and emergency wagon for use at the airport was passed by the Airport Advisory Board and will be presented to the council. The type of wagon recommended by the board has been approved by the Fire Commissioner.

ORGANIZATION of the Floyd Smith Safety Chute company, to manufacture parachutes, was recently announced by Floyd Smith. Cross-patent agreements have been effected with the Irving Air Chute Corporation. For the present, the parachutes of the Smith company will be manufactured in the Irving plant. A parachute factory will be built by the Smith company this summer. The office of the company is located in the Genesee Building, Buffalo.



Kingfisher Flying Boat to be produced by Whittelsey Manufacturing Company as the Whittelsey Amphib and as a flying boat

NEW ENGLAND

AN AIRSHIP to be used for commercial purposes in the New England area has been delivered by the Goodyear Zeppelin Corporation of Akron, Ohio, to Mr. A. G. Wadsworth, head of the New England Airship Corporation. Two pilots, who have been connected with the Goodyear fleet for some time, flew the ship from Akron to New Bedford, and will remain with the ship for an indefinite period.

THE Whittelsey Manufacturing Company, Inc., of Bridgeport, Conn., has purchased all the capital stock and assets of the Taft Airplane Corporation, which developed the Fingerfisher flying boat, according to a recent announcement of officials of the company. Construction of the Kingfisher was started August 1, 1928, and the first test flight was made on February 22, 1929. Further engineering improvements were made during a period ending September 7, 1929. On that date the plane was judged to be satisfactory and has since been flown more than 100 hours, during which time minor refinements were incorporated.

The Whittelsey Manufacturing Company, is, upper thirty sevent feet, and lower, Inc., will manufacture the Kingfisher, under the name of Whittelsey Amphib. The ship will also be produced without amphibion gear as a three-place plane with increased power.

The wing span of the Whittelsey Amphib is, upper, thirty-seven feet and, lower, twenty-one feet six inches. The length overall is twenty-four feet nine inches. The pusher type of propeller is provided.

THE Boston base of the Curtiss-Wright Flying Service opened a summer ffying school at Marthas Vineyard, Mass., June 20. Edward Dungan is manager of the camp. Complete courses will be given, including twenty, fifty and two hundred hours of flying. Four weeks' courses leading to private pilot's licenses will be given at the school in addition to longer courses qualifying for Department of Commerce examinations for limited commercial and transport-pilot's licenses.

New England Air Tour and Dedicatory Ceremonies of Bowles Airport Springfield

JAMES Haizlip of the Shell Petroleum Corporation, flying a Travel Air Mystery S, won first prize of $500 cash in the free-for-all race held at Bowles Airport during the Springfield, Mass., Air Races in conjunction with the New England Air Tour May 28-June 1. Haizlip waived first prize money, and it was awarded to Casey Jones, who finished second. The trophy won by Haizlip is of silver in a modified, round column design and is approximately two feet high and about six inches in diameter. The trophy is the permanent property of the winner.

The races were included in the dedicatory ceremonies of Bowles Airport, held in conjunction with the New England Air Tour. The tour started at Springfield and flew over a route in all six of the New England states, returning to Springfield and ending at Bowles Airport for the dedicatory ceremonies, May 30, which included an address by Calvin Coolidge. There followed a two-day race program. The winners of the events in addition to the free-for-all race May 31, included Wilfred G. Moore, twenty-five mile race for planes with 450-cubic-inch engine displacement, Inland Sport; E. Fisher, dead stick landing, Aeromarine Klemm; and Freddie Lund, bomb dropping, Inland Sport.

The winners of the events May 31 included Freddie Lund, twenty-five-mile race for planes with 450-cubic-inch engine displacement, Inland Sport; N. E. Grevenberg, twenty-five-mile race for planes with 800-cubic-inch engine displacement, Pitcairn; and Capt. H. Generous, twenty-mile National Guard race.

(Continued on next page)

MANUFACTURER OF PROGRESSIVE AIRCRAFT FINISHES

6 NEW COLORS IN BERRYLOID AIRCRAFT DOPE



LOW cost, long life and rich beauty feature the six new Berryloid Dope Colors just announced. Consolidated and Austin Blue, Robin Orange, Robin Yellow, Olive Drab No. 22 and U. S. Army Yellow No. 4 are now added to an already wide range of popular standard colors. Approved by the U.S. Air Corps and the Bureau of Aeronautics, first choice of most aircraft manufacturers — Berryloid has won recognition everywhere as the best pigmented dope on the market. It is light, can be brushed or sprayed on fabric or metal, won't crack or ringworm on either type of surface under severe pressure and costs approximately one-half as much as other types of finish. Berryloid Pigmented Dope offers utmost resistance to weathering, can be refinished successfully and is non-toxic—won't harm workmen. Complete stocks are carried at all important aircraft centers. Get the facts about this remarkable dope. Write for combination color card and new finishing specifications.

BERRY BROTHERS
Varnishes Enamels Lacquers
Detroit, Michigan *Walkerville, Ont.*

MEMBER AERONAUTICAL CHAMBER OF COMMERCE

(New England News continued)

A SUMMER flying school was opened by Skyways, Inc., of Boston, Mass., at Marston's Mills, West Barnstable, Mass., June 15. The school is under the direction of Crocker Snow and Olcott Payson and will accommodate approximately twenty students. A field, 2,800 feet long by 2,000 feet wide, is utilized for student instruction. A golf club, located near the flying field, and tennis courts are available to students.

Completes Non-Stop Flight From Waterbury, Conn., to Miami, Fla.

A NON-STOP flight of 1,400 miles from Waterbury, Conn., to Miami, Fla., was completed on June 3 by Gus Graf at an average speed of about sixty-three miles per hour. He used a plane designed and constructed by himself and powered with a Beetle engine of 120 horsepower. The flight was made for the purpose of testing the safety features of the plane and the engine and the practicability of long-distance flights with a small engine.

Graf took off from Bethany Field at 6:30 p. m., June 2, and landed at the municipal airport, Miami, Fla., at 4:35 p. m., the following day. He carried 165 gallons of fuel, consuming 124 gallons on the flight. Equipment used included rocket pistol and flares, a special set of instrument board lights, flashlights, and flight instruments for "blind" flying.

The ship is a parasol monoplane, a Sikorsky wing and a Standard fuselage with slight alterations being utilized in the construction. The wings are supported above the fuselage by means of N cabane struts and oblique struts from the fuselage to the wing. The plane is equipped with special tanks placed in the front cockpit and in the wing, and a special oil tank with baffle plates installed to control the flow of oil to the engine; this equipment was designed and installed by Mr. Graf.

The power plant utilized is a 120-horsepower Beetle engine manufactured by Kimball Aircraft, Inc., of Naugatuck, Conn. The engine is of the radial type and is provided with a special cowling designed by Mr. Graf. Air vents controlled from the pilot's cockpit are provided.



The Kimball Beetle Aircraft Engine

NEW JERSEY

REDUCTIONS in prices and the inauguration of a new sales policy were announced recently by New Standard Aircraft Corporation of Paterson, N. J. The price of the five-place open-cockpit New Standard, powered with Whirlwind J-5 or J-6 225-horsepower engine, was reduced from $9,750 to $7,990. The Kinner-powered trainer, similar to the United States Navy NT-1, was reduced from $4,475 to $3,131.

Because more than ninety per cent of New Standard sales have been made directly to commercial operators, officials announced the sales policy of the company has been changed to eliminate distributors, large discounts and exclusive territory. All prices of Standard ships will be net, except that registered owners of New Standards are given a small commission for selling additional ships.

The New Standard sport plane, Kinner-powered, continues to list at $5,100 with larger discount allowance for the seller.

A THREE-STORY brick factory building at the northeast corner of Tenth and Market streets, Camden, N. J., formerly known as the Caffrey Carriage Works and later as the Drum Works, has been acquired by the Imperial Aircraft Company. The building is being renovated and it is expected to put it in operation this month. The company will manufacture a low-price airplane and gliders.

For the past two years the company has been carrying on experimental work at McCusker Field at Pine Valley and has operated a temporary assembly plant located in Camden. The company is headed by J. E. McCusker. Mr. McCusker is former chief inspector of the United States Army Ordnance Department and a former chief supervising inspector for the British Government in the Royal Engineers.

PENNSYLVANIA

THE Third National Oil and Gas Power Meeting was held at Pennsylvania State College, June 12-14. The meeting was held under the auspices of the Oil and Gas Power Division of The American Society of Mechanical Engineers. A paper on the gas turbine for aircraft propulsion, by C. A. Lorenzen of Germany, was included among sixteen papers presented at the meeting. The paper contains detailed explanations of the gas cycle in the turbine with illustrated discussion of the mechanical construction.

DEDICATORY ceremonies of Milford Airport, Milford, Pike County, Pennsylvania, will be held July 4-6. The field comprises 155 acres. Runways, into the prevailing wind, are 2,900 feet in length, and cross-runways are 2,700 feet and 2,900 feet in length. Construction of a hangar sixty feet by one hundred feet was recently completed.

Two 1,000-gallon tanks have been installed for use in fueling planes.

JOHN J. TILTON of Canton, Ohio, and William W. Murry of Pittsburgh, Pa., transport students at the Penn School of Aviation, Pittsburgh-Butler Airport, Pittsburgh, Pa., have been selected by the Army Air Corps in its experiment of giving advanced military training at Kelley Field to graduates of twelve approved commercial schools in the United States.

A FORD all-metal trimotor transport plane powered by Wasp Junior engines has been sold to Clifford Ball, Inc., of Pittsburgh, for operation in regular passenger and mail service between Cleveland and Pittsburgh. The ship is the first of this type to be equipped with the Wasp Junior power plant.

The three Wasp Junior engines, of 300 horsepower each, drive the plane at a maximum speed of 130 miles per hour. The cruising speed is 107 miles per hour and the stalling speed is fifty-seven miles per hour. Seats are provided for twelve passengers.

PHILADELPHIA

[R. GARD]

LIEUT.-COMDR. ROBERT S. HEDTLER of the United States Naval Reserve has been recommended by Mayor Mackey to head the Bureau of Aeronautics which the city council plans to create in the Department of Public Works. The chief of the bureau will engage with engineers of the Department of Public Works in the construction of the authorized municipal airport and will supervise its operation. Comdr. Hedtler is the commanding officer of the Naval Reserve aviation unit at Philadelphia.

TWENTY-FIVE airplanes, comprising the group which flew in the Pennsylvania Air Tour, recently landed at the Philadelphia Airport. On their arrival members of the tour were welcomed by representatives of the Aero Club of Pennsylvania and the Aviation Committee of the Chamber of Commerce. The pilots made one other stop in the Philadelphia area, landing at Patco Field, near Norristown.

THE complete line of Stinson airplanes, ranging from the popular-priced four-place cabin ship to the trimotor transport job, will be sold in this territory by the Wings Corporation, according to a recent announcement. The Wings Corporation is located at Central Airport.

THE new factory of the Pitcairn-Cierva Autogiro Company, located at Pitcairn Field, is rapidly nearing completion. Active production of the latest types of the autogiro will begin within a month.

THE rates for passenger hops were recently reduced at Pitcairn Field. The lowest fare is $1.50, other flights, longer

(Continued on next page)

SPEED

Alexander Bullet Speed and Capacity Result in Economy

More than pride makes an owner delight in flying a fast airplane. *Speed* means safety because there is less chance of motor failure. *Speed* saves time. *Speed* means economy because the motor operates a shorter time, using less fuel and undergoing less depreciation. Couple *speed* with large carrying capacity as in the Bullet and you have operating economy coupled with earning ability.

Speed is the chief characteristic of the Alexander Bullet—*speed* with low horse power. It carries four people and a dog—a total disposable load of 1060 pounds—powered with a small 165 h.p. engine.

Speed is attained through clean lines. There are no exterior struts or wires to hold the Bullet in its race through the skies. There is no resistance that is not essential to performance and maneuverability.

In addition to *speed,* the Alexander Bullet offers those other features you want in an airplane—quick take-off, extremely slow landing speed, rapid climb, maneuverability, and comfort.

Treat yourself to a Bullet demonstration at your first opportunity. Not until then have you approached the ultimate in airplane transportation.

Send for specification and performance figures on the Bullet. It will fit into your airplane program whether you are a private flyer or an operator.

EQUIPMENT: Powered with Wright J-6 165 h.p. motor; equipped with Bendix brakes, flying and landing lights and compass in addition to usual instruments. Retractable landing gear, or stream lined gear, is optional equipment.

$7200

Flyaway Factory



Alexander Glider for Flight Training

You can become a qualified glider pilot for less than the cost of one hour of airplane instruction. Form a club among your friends. We tell you how. Twenty members can organize and obtain an Alexander Trainer by putting up $25 each.

In the Alexander Trainer you have the best in glider strength and performance. Thirty-six feet of high lift wing give it flight ability. Clubs are flying Alexander Trainers at 6,200 feet above sea level—*and higher.* That is the reason glider pilots are so pleased with its performance at lower altitudes.

Rugged construction is characteristic of the Trainer. One wing, inverted to simulate flight conditions, supports 1731 pounds of sand in the research laboratory. This is 14 times the stress of normal flight. The fuselage is of welded steel tubing, with triangular construction at the points of greatest stress. There is no sacrifice to safety in building the Alexander Trainer. Modern factory methods produce this stable glider along airplane quality lines for (F. O. B. factory) **$375**

Your name and address will bring a description of the Alexander Trainer and directions for organizing a glider club. We also have plans under which you may become a dealer or operate a glider school. Either can make you a good profit. Send for details today.

Write or wire for complete details

ALEXANDER AIRCRAFT CO.

403 Alexander Industries Bldg.
Colorado Springs, Colo.

(Pennsylvania News continued)

in duration, being at slightly higher rates. Trips are made in Curtiss Robin, Fairchild, or ships of Pitcairn design.

VICTOR Dallin, aerial photographer, has acquired the distributorship in this territory for Consolidated Fleet training planes. He recently took delivery on the first Fleet.

THE sport of gliding continues to arouse interest in the Philadelphia area. The Wings Corporation, Waco distributors in this territory, report that in the first few weeks since the debut of the Waco glider here, more than seven of the motorless ships have been sold.

THE recent signing of the city's agreement with the United States Shipping Board for the purchase of the Government-owned Hog Island tract, the site of Philadelphia's new municipal airport, marked the final chapter in negotiations which the city has carried on for more than a year, and will permit an immediate start on the development of the air-rail-marine terminal as originally planned. The contract calls for a payment of $3,000,000 to the Shipping Board by the city for the shipyard, a down payment of $450,000 being required, the balance of $1,000,000 which voters have authorized for the project to be used in the development of the airport site.

PITTSBURGH

[Bob Coates]

THE Pittsburgh Aviation Industries Corporation, of which George Hann is president, has started opposition in the application of Pittsburgh Airways, Inc., for the right to operate as a common carrier for the transportation of passengers, freight and express, in intrastate service between Philadelphia, Newark, N. Y., and Pittsburgh. Testimony was heard by Commissioner Charles M. Young of the Public Service Commission.

Pittsburgh Airways has been operating a call-and-demand service. The company has asked the exclusive right to operate regularly on a route from Pittsburgh to Philadelphia via Greenburg, McConnellsburg, Chambersburg, Gettysburg, Lancaster and Philadelphia.

J. G. Condon, treasurer of the Airways company and principal witness, declared that arrangements already had been made for use of airports at various places along the route. He announced that his company had purchased a trimotor Ford and that at present three Travel Air ships were being used on the route.

Clifford Ball, air mail contractor, and operator of the "Path of the Eagle" line between Cleveland and Washington, via Pittsburgh, was a witness. Ball testified that he believed there was sufficient demand for such a service.

The Pittsburgh Aviation Industries Corporation is owner of the Pittsburgh-Butler Airport and the Penn School of Aviation.

Bob Dake is president of Pittsburgh Airways, Inc.

STUNT flying and balloon strafing contests have been added to the regular Saturday and Sunday programs at the Pittsburgh-Butler, Pittsburgh-Greensburg and Bettis Curtiss-Wright airports.

CLIFF BALL has purchased a new Ford trimotor transport. The Ford he acquired some time ago, through a merger with Pennsylvania Airlines, has been sold to Pittsburgh Airways, Inc., for service between Pittsburgh and New York.

THE improvement of Bettis Airport has been started. Driveways have been completed in addition to the three parking spaces which will accommodate 1,500 automobiles. Steel fences have been installed on the outside boundaries of the tract. Fences to protect visitors at taxi and landing areas have been erected inside the boundary fences.

MORE than 200 students of the University of Pittsburgh, in opening their senior week, went plane riding at Bettis Airport recently in ships furnished by the Curtiss-Wright Flying Service. The students were permitted to choose the plane in which they wished to ride and were taken over the city and the Pitt campus. More than 300 students and faculty members were taken on a tour of the hangars, repair shops and offices at the airport. Each ride required about a half hour.

A DINNER and an aerial exhibition were held during ceremonies coincident with the return of members of the Pennsylvania Goodwill Tour at Curtiss-Bettis Field. Nearly thirty ships completed the flight.

MARYLAND

[E. W. Walsh]

AN OFFER to acquire the Berliner-Joyce Aircraft Corporation of Baltimore, Md., has been made by the North American Aviation, Inc., of New York, according to an announcement made by officials June 11. The plan calls for the formation of a new corporation and the exchange of Berliner-Joyce Aircraft Corporation Class A stock share for share for Class A stock of the new corporation. In addition, stockholders of the Berliner-Joyce company will receive an option of converting their new stock on a basis of two shares for one of North American Aviation, Inc.

The plan of absorption by North American Aviation, Inc., in addition to the organization of the new corporation, calls for an additional issue of 44,000 shares of stock of the new concern for $300,000, and an agreement to furnish additional working capital up to $250,000 during the coming year when and if necessary. There are approximately 38,000 shares of the Berliner-Joyce stock outstanding.

The officers of the Berliner-Joyce Aircraft Corporation include the following: W. Frank Roberts, chairman of the board; W. W. Moss, president; and Temple N. Joyce, vice president. The directors include Charles L. Phillips, B. F. Castle, Ralph B. Leonard, and Townsend Scott, Jr.

FINAL tests of the XFJ-1, the new single-place fighting plane for the Navy Department, has been completed by the Berliner-Joyce Aircraft Corporation. The final tests were pronounced successful. Officials announced that present factory facilities probably will be expanded for further production orders on this plane and on the new two-seater pursuit ships now in process of completion under contract for the United States Army Air Corps.

In addition to orders for fighting and pursuit planes awarded to the Berliner-Joyce company by the Government, an order for the construction of a large number of stainless steel metal pontoons for Navy training planes was received.

WILLIAM H. MILLER, chief research engineer of the Berliner-Joyce Aircraft Corporation of Baltimore, Md. was the principal speaker at the meeting of the Women's Flying Club of Baltimore. Mr. Miller spoke on the "History and Development of Aviation."

A REDUCTION of approximately 300 per cent in rates for airplane taxi rides has been put into effect at four airports at Baltimore, Md. On the first day the reduced rates went into effect at three of the local airports, the planes were unable to accommodate all the passengers applying for taxi rides. The fields reducing these rates are the Steinmetz Airport, the Geiske Airport, Handler Field and the Curtiss-Wright Flying Service at Logan Field. At Handler Field and Steinmetz Airport, flat rates of $1 per passenger have been established. At the Geiske Airport passengers are charged according to weight at the rate of one cent a pound.

A BRANCH of Parks Air College of East St. Louis, Ill., division of the Detroit Aircraft Corporation, will be established at Baltimore, Md., according to an announcement of P. N. Hewitt, sales manager of the school. Alfred W. Geiske, Jr., will be director of the school according to the announcement. Offices will be opened at 1,307 North Charles Street.

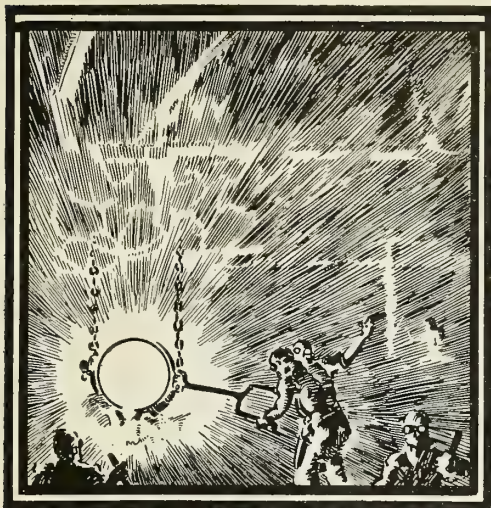
WASHINGTON, D.C.

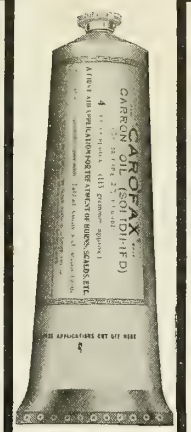
ESTABLISHMENT by the aviation section of the Woman's City Club of a ground school, with flight instruction to follow, was announced recently by Mrs. Edgar T. Brown, chairman of the section. Mrs. Lyle Burns Steever, aeronautical director of the club, will act as manager of the school which will be conducted under the supervision of the Curtiss-Wright Flying Service.

A standardized ground school course will be taught by Lieut. Louis M. Rawlings, Jr., in accordance with the approved school requirements of the aeronautics branch of the Department of Commerce. One evening session to be held each week, will consist of two one-hour lectures.

The course will include theory of flight, construction and maintenance of engines,

(Continued on next page)





Cut shows reduced size.



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Carron Oil Solidified With 2% Phenol Content

has a remarkable service record here and abroad.

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(Washington D. C., News continued)

meteorology, aerial navigation and aerodynamics. In addition to the regular course, the club is planning lectures by aviation experts in the Governmental and commercial service.

A flying club, to be known as the Eagle Wings Flying Club will be organized by the Women's City Club, and a slot-winged D. H. Gypsy Moth will be purchased for student training. The club will operate from College Park, Md., under supervision of the Curtiss-Wright organization. Membership in the club will be opened to men and women, whether associated with the Women's City Club or not.

OHIO

A BALLOON club has been organized at Akron, Ohio, the nucleus of the organization being made up of men connected with the Goodyear-Zeppelin Corporation. The club has a membership of forty. Six balloons will comprise the fleet to be operated by this new organization.

The officers of the club include Ward T. Van Orman, president; Lieut. T. G. W. Settle, chief of the U. S. Navy inspection staff in Akron, first vice president; Frank White, second vice president; Guy F. Feaster, secretary; and Karl Fickes, treasurer.

THE Aircraft and Sportsmen's Exposition will be held at the Transcontinental Airport, Toledo, Ohio, July 1-6. Exhibits to be shown under canvas will include planes, aviation apparel, equipment and aeronautical accessories.

THE Earl C. Ewing Aircraft Service, formerly of Bryan, Ohio, has moved to a new field under construction at Montpelier, Ohio. Mr. Ewing will operate a service field for transit ships distributing gas, oil, and making repairs. A number of fliers will operate at the field this summer. Construction of a runway has been completed and the development of additional runways has been started.

WINGS, Inc., has been organized at Cleveland, Ohio, for the purpose of promoting aviation in the vicinity of Cleveland. Included in the initial activities of the company is the expansion of Dungan Airways, Inc., which will be a subsidiary of Wings, Inc.

TEST fights of a Lockheed plane with a gasoline capacity of 800 gallons and a cruising radius of over 4,000 miles were being conducted at Port Columbus, Ohio, in May by William S. Brock, 'round the world flier. Included in the equipment of the plane was a radio apparatus.

EVERETT LEE, transport pilot, has purchased a seventy-five-acre field at Napoleon, Ohio, which will be developed into an airport to be known as the Napoleon Exchange Airport Corporation. Everett Lee is president and treasurer; D. B. Lee is vice president and F. E. Parker is secretary. A forty by sixty concrete block hangar has been constructed in addition to several small hangars for private planes. Mr. Lee and Mr. Parker have taken the American Eagle Agency for this territory and have accepted delivery of a Kinner-powered American Eagle. They will operate a flying school known as the Parker-Lee flying school. Mr. Lee was formerly chief instructor at the Bryan Flying School at Bryan, Ohio.

CLEVELAND

GLIDER activities are in full swing at Cleveland where new clubs are being formed in preparation for contests to take place during the International Gordon Bennett Balloon Race on Labor Day. A group of young men employed in the factory of the Great Lakes Aircraft Corporation met recently and after hearing a talk by L. F. Ross, president of the Cleveland Glider Association, appointed a committee, headed by J. A. Wilber, to arrange for organization of a club and to either buy or build a glider.

THE 1930 program of the Cleveland Airport Operators Association will include an active participation in promoting aeronautics, according to J. W. Borton, president, who recently succeeded "Cliff" Gildersleeve. Special attention will be paid to all city council legislation affecting the municipal airport. Hereafter, the association will transact its business at semi-monthly informal luncheon meetings.

TWO Travel Air training planes powered with Challenger engines have been added to the equipment of the Curtiss-Wright Flying Service at Herrick airport, east of the city.

L. W. BRYANT, who has been flying trimotor Fords on the Detroit-Cleveland-Buffalo private freight line of the Ford Motor Company has replaced Leon Sherrick as pilot of passenger planes on the Cleveland-Detroit Stout airline. Sherrick will fly the new Ford purchased by the Timken Roller Bearing Co. of Canton.

COLUMBUS

[W. DONALD WALTER]

AIR CORPS RESERVE officers are making good use of the facilities at Norton Field. April set a new record for hours flown, and May surpassed April, with a total of almost 150 hours. Over one hundred additional hours have been obtained for the field for the remainder of the fiscal year, and it is certain that this time will all be used. The extension of the flying radius allowed Reserve pilots has stimulated activities, and with two O-11's available for use in the near future, in addition to the PT's, it appears that full advantage will be taken of the additional time allotted.

THE Curtiss-Wright Flying Circus, which has been staged at various airports throughout the country, appeared at Port Columbus, May 24 and 25. The exhibition was opened each day by a flight of three Travel Airs over the city. These ships were equipped with wind-driven sirens, their screeching being plainly audible above the roar of the motors. The program at the field included aerobatics, singly and in formation, demonstration of vertical banks and other maneuvers in a Ford trimotor, a flight by a two-place biplane glider, the first of this type seen in Columbus, multiple parachute jumps from the Ford, and tight spins by a woman pilot.

THE Goodyear blimp *Mayflower* was a recent visitor at Port Columbus.

JAMES F. STEPHAN, a second lieutenant in the Infantry Reserve, is one of two Columbus men passing the required examinations for cadet in the Air Corps, Regular Army. Stephan, who has made a number of flights from Norton as a passenger, was ordered to report at March Field for duty July 1.

CONTINENTAL AIR LINES have requested permission to use Port Columbus for the Louisville-Cleveland air mail line. The air mail ships have been using Columbus Airport, west of the city. Authority for the use of Port Columbus has been granted by City Council, in return for a nominal landing fee.

A CONTACT camp for Reserve officers was held at Norton Field and Fort Hayes, May 24 and 25. All of the first afternoon was given over to the Air Corps, one hundred officers from other branches of the service being flown by Regular Army and Air Corps Reserve pilots. In addition to the four ships at Norton Field, two O-11's and several PT's were flown from Bowman, Lunken and Schoen Fields.

SEVERAL sections of T.A.T.-Maddux ships out of Port Columbus each day continues to be the rule. On Memorial Day the list of forty-five paying passengers set a new record. Although the 500-mile race was being run at Indianapolis, only four or five of the passengers were booked for that city, the remainder going to St. Louis or beyond. On the same day, a number of independent commercial ships cleared the Port for Indianapolis, among them being the Ford of the Timken Roller Bearing Company.

LIEUTENANT McCONNELL went to Langley Field by rail early in June and ferried back on O-11 for Norton Field. After our mechanics have gone over this ship thoroughly, it will be turned over to the Reserve pilots, most of whom will have to be checked out on it by Major Muehlenberg or Lieutenant McConnell before being turned loose. All the pilots are anxious to pile up time in service type ships, and the two O-11's will be kept busy.

LIEUT. WALTER MEYER, Air Corps, formerly of Columbus, was one of the Army pilots who landed their Loening amphibions recently in a rough sea off the Hawaiian coast in an effort to assist the crew of a bomber which had been forced down. Meyer, who is now stationed at Luke Field, is well known here, having been one of the charter members of the Aero Club of

(*Continued on next page*)

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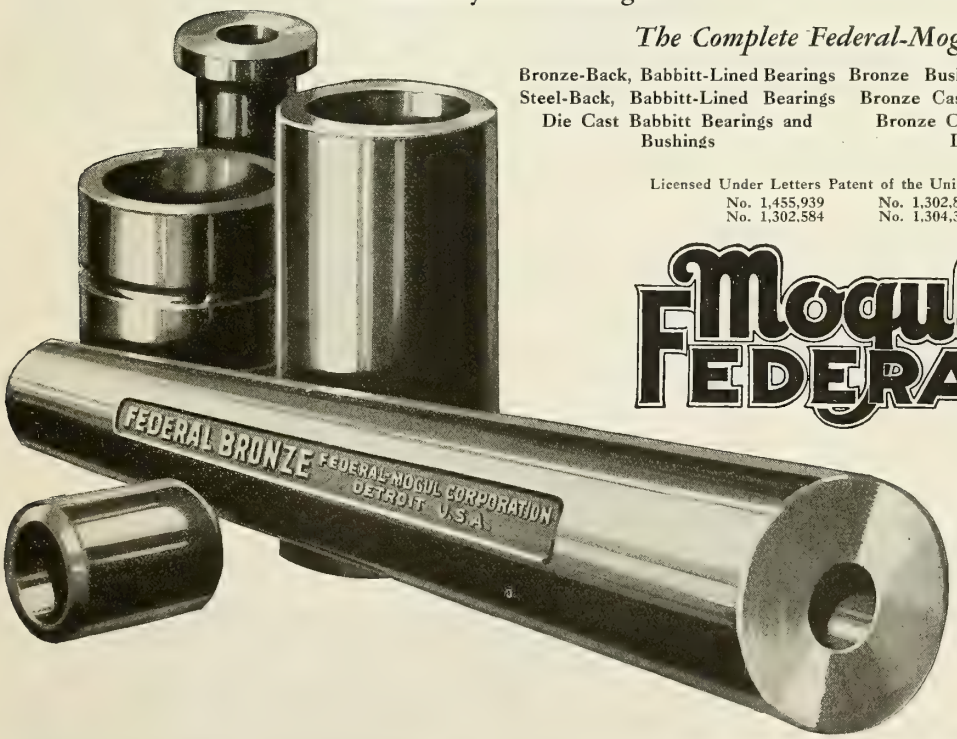
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Mogul FEDERAL

FEDERAL-MOGUL CORPORATION - DETROIT, MICHIGAN

(Ohio News continued)

Columbus. He returned to the Air Corps several years ago.

TWO new passenger transport lines inaugurated operations from Port Columbus in June. Continental Airways, Inc., of Chicago, is operating between that city and Columbus as a link in the air-rail hook-up between New York and Chicago, with the Pennsylvania, and between Southern points and Chicago, with the Norfolk and Western. Ships will make connections at Port Columbus morning and evening with the Pennsylvania's Airway Limited, the train which takes the passengers from the T.A.T.-Maddux Lines. Travel Air cabin jobs, Wasp-powered, will be used. Extension of this route to Memphis is being considered. This organization has no connection with the Continental Air Lines Division of Universal. The second line is operated between Youngstown and Columbus by Ohio Air Transport, Inc., of the former city. A stop will be made each way at Akron. Bellanca cabin ships are being used.

A NICHOLAS-BEAZLEY Flying Club is being organized in Columbus, under the direction of Dr. H. E. Clybourne and a factory representative of the Nicholas Beazley Airplane Company. It is planned to have fifteen members, over half of whom have been selected; one of these is a girl. Complete plans have been worked out to provide flying training for members at low cost. The initial fee will be approximately $250.00, which includes a share in the airplane and insurance protection while undergoing dual instruction. A charge of $8.60 per hour will be made for dual instruction, and $5.60 per hour for solo flying. After the student is soloed, an additional charge of $6.00 per month is made for insurance. A Barling NB-3 monoplane, powered with a seventy-horsepower LeBlond engine, will be used.

MICHIGAN

THE Verville-Packard Diesel Coach developed by the Verville Aircraft Company of Detroit, Mich., is powered with a 225-horsepower Packard Diesel engine.

Beyond adjusting the throttle to suit the speed requirements of the operator there are no engine controls demanding attention, according to officials of the company, and four dollars will purchase sufficient fuel to fly the ship from Chicago to New York.

The plane is provided with the following equipment: standard steel propeller, Eclipse electric inertia starter, generator, Bendix wheels and brakes, Oildraulic shock absorber, full caster tail wheel, dual wheel controls, retractable landing lights, navigation lights, six-volt battery, fire extinguisher, tool kit, and flight instruments.

The performance of the Verville-Packard Diesel Coach is as follows: high speed, 130 miles per hour; cruising speed, 105 miles per hour; service ceiling, 15,000 feet; climb, 900 feet per minute; landing speed, forty-eight miles per hour; and cruising range, six and one-half hours.

MORE than 750 flights have been completed by members of the Roosevelt High School Glider Club, Wyandotte, Mich., using two primary training gliders constructed by the club and financed with the aid of the Roosevelt High School. There have been no serious accidents or injuries to pilots. Eight members of the club recently qualified to try for the third class glider pilot's license. In addition to the gliders, the club owns tools, shock cord, and a double trailer. The officers of the Roosevelt High School Glider Club are as follows: Henry Fauser, president; Avery Cameron, secretary; and Robert Patneau, treasurer.

THE Great Lakes Air Cruise will be held August 8-17, according to a recent announcement of officials of the Detroit Flying Club, sponsors of the event.

The cruise will be open to amphibions, seaplanes and landplanes fitted with pontoons. Wayne J. Sheldon, aviation representative of the Standard Oil Company of Indiana, will be commander of the tour.

A pathfinding trip carrying officials of the cruise left Detroit May 26 in two planes. Paul Strasburg, who is cruise referee, will confer on the preparatory flight with local committees on the harboring facilities necessary for the armada.

A NEW building equipped with a traveling crane has been added to the plant of the Ex-Cell-O Aircraft and Tool Corporation of Detroit, Mich., according to a recent announcement of officials of the company. The Wayne Tool Company, the H. R. Kreuger Company, and the Wolverine Screw Company which compose the Airports and Tool Corporation and were acquired by the Ex-Cell-O company on March 11, began operations in the new building on May 10. The Continental Tool Works of Detroit were acquired by the Ex-Cell-O company recently.

THE Third National Airplane Model League of America Contests will be held at Detroit, Mich., June 30-July 1 under the supervision of the *American Boy Magazine*, sponsor of the association. Members of the league under twenty-one years of age will be eligible to compete. Included in the prizes which will be awarded the winners of the various events are a trip to Europe which will be awarded each winner of three events; forty-eight silver cups; 150 bronze medals; $3,175 in cash; scholarships and merit certificates.

THE Stinson Junior, equipped with Edo Model 3300 float installation, recently completed the Department of Commerce tests on floats and has been awarded Approved Type Certificate 295 as a seaplane. This ship is known as the Stinson SM8A Seaplane. It is powered with a Lycoming engine and provided with electric self-starter. Preliminary tests were conducted by George B. Post, vice president of the Edo Aircraft Corporation, and Roderick Wright, chief test pilot of the Stinson Aircraft Corporation, followed by formal inspection and test by the Department of Commerce, all of which were run on Lake St. Clair, Mich. This ship is the twenty-seventh type of land plane to be approved by the Department of Commerce as an Edo-equipped seaplane.

[K. F. ZEISLER]

THE first Michigan Airport Conference was held at Traverse City, Mich., June 13-15, under the sponsorship of the Michigan Municipal League. Representatives of county and municipal governments attending the conference were addressed by members of the Department of Commerce, the Michigan State Board of Aeronautics, aircraft operators and airport engineers.

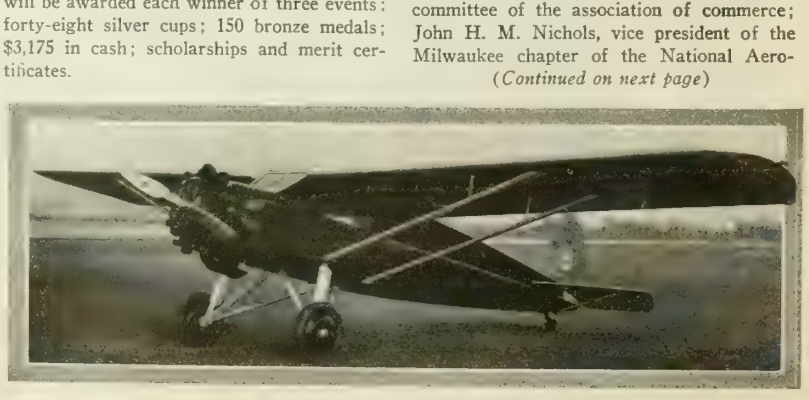
THE State Board of Aeronautics has approved the employment of Capt. Ray Collins as director of aeronautics and of Sheldon B. Steers, assistant. Collins and Steers recently completed the first inspection tour of State airports and schools. Of the fifty-four airports applying for licenses, twenty-eight have been granted. Of thirty-eight schools applying for licenses, fourteen were approved. Twenty-three of 100 instructors applying have been licensed. Four of the schools have been approved to give training leading to transport pilots' licenses; three, limited commercial; and seven, private licenses.

WISCONSIN

[W. SCOLLARD]

ALDERMAN CORNELIUS CORCORAN, president of the Milwaukee Common Council, has appointed an airport committee to study the aviation and landing field problems of Milwaukee. The committee is headed by Alderman S. N. Soref and includes Clarence Falk of the air service committee of the association of commerce; John H. M. Nichols, vice president of the Milwaukee chapter of the National Aero-

(Continued on next page)



Verville Air Coach powered with a Packard Diesel engine



AMERICA'S FASTEST TRI-MOTOR

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FOKKER

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(Wisconsin News continued)

nautic Association; Frank Vaughn, Alderman Ole A. Olsen, R. A. Steinhagen, Charles Bennett, city planning engineer, and C. U. Smith, harbor terminal directors. Assemblyman Harry Slater, a member of the legislature's aviation committee, will represent the State on the city commission.

ARTICLES of incorporation have been filed by the Aircraft Sales and Service Corporation of Milwaukee. The company will operate and distribute aircraft and has been authorized to issue 250 shares of common stock at $100 per share. The incorporators are M. R. Morrissey, M. Madden and W. F. Loebe.

E. M. KNAUP, secretary of the Midwest Airways, Inc., Milwaukee, has announced the addition of Joe McBride, former aviation mechanic, to the engine service staff of the Midwest company. Mr. McBride is a former aviation mechanic in the Army Air Corps. He will assist Ted Karnstedt, superintendent of maintenance at the Midwest Airways hangars, and will also assist in the instruction of flying students at the Midwest school.

E. F. DORSEY has been named general manager of the ground school of the Weeks Aircraft Corporation, Milwaukee. He is a graduate of the United States Navy aviation mechanical school.

THIRTY-SIX airplanes took part in the formal dedication of the new $15,000 municipal airport at West Bend, Wisc., on May 25. Ships from all sections of Wisconsin and some from out of the State participated in the contests which officially opened the new field. The dedicatory program was sponsored by the Lieut. Ray Dickop Post of the American Legion.

THE Wisconsin Flying Service, a company which will engage in airplane transportation and operate a glider school, has been organized at Madison, Wis. The incorporators of the company are John Murphy, J. L. Shannon and William Greub.

THE construction of Vilas County's new airport at Phelps has been started. When completed this airport will be one of the largest in Northern Wisconsin, according to present plans.

THE Northern Air Express Company has been organized at Merrill for the purpose of conducting an air service and giving student instruction. The officers of the company include: C. B. Schmitt; D. H. Doriot, vice president; E. E. Schumacher, secretary; Jack Munson, treasurer, and George F. Cline, field representative and director of sales.

THE Northwest Flying Service, Inc., has filed articles of incorporation at La Crosse and has been authorized to issue sixty shares of common stock at $100 per share. Incorporators are W. Hurtgen, R. Hurtgen and D. S. Law.



Stinson Monoplane equipped with Edo Floats approved by Department of Commerce

THE Wisconsin Northern Airways of Rice Lake has completed the construction of a fifty foot by fifty foot hangar of concrete and wood at a cost of $1,000. The building will accommodate three planes and contains a workshop fourteen feet by thirty feet, and an office fourteen feet by twenty feet.

THE Esline company has leased the airport at Oconomowoc to Harold Westfahl, Milwaukee, according to an announcement made by George L. Kohn, manager of the Esline company. The company will operate a Ryan plane between Oconomowoc and the Milwaukee County airport, where he has a hangar.

[E. M. KUSCHBERT]

THE dedication of the West Bend, Wis., airport was held May 25. The field is ninety-five acres in extent and is equipped with boundary lights, landing lights and a revolving beacon. This field will be used as an emergency air mail landing field.

CONCRETE has been selected by the county highway commission for the construction of the apron in front of the new administration building at the County Airport, Milwaukee. The apron will be 200 feet by 440 feet. The material to be used for permanent runways has not been decided upon. Cinders will be used for the present. It was agreed that all employees will wear uniforms and funds for this purpose have been provided.

MINNESOTA

THE City of Duluth will officially dedicate its new half-million dollar airport during ceremonies scheduled September 13-14. The dedication was postponed from September 1-2, to avoid conflict with the National Air Races at Chicago August 23-September 1.

Construction of a new municipal hangar and administration building on the airport is scheduled to be completed when the dedication is held. Governors of Minnesota, Wisconsin and Michigan will be in attendance.

[L. E. YOUNGSTROM]

FORMALLY inaugurating airplane passenger service between Spokane, Wash., and St. Paul, Minn., a Mamer Air Transport plane, one of the company's three ships, landed at the St. Paul Municipal Airport shortly after 9 p. m. June 9. The plane left Spokane in the morning and stopped en route at Butte, Billings and Miles City, Mont., and Aberdeen, S. D. Tom Strickler piloted the ship from Miles City to St. Paul. Three passengers were aboard. The return flight was made the next day. Trips will be made every other day each way hencefo'th.

Planes will leave St. Paul at 7 a. m. Tuesday, Thursday and Saturday of each week, arriving at the western terminal in Spokane at 7:45 p. m. of the same day. On the eastward flight, planes will leave Spokane at 7 a. m. Monday, Wednesday and Friday of each week.

ALTHOUGH Minnesota's quota of twenty young men in the flight training of the United States Naval forces already is filled, Lieut. Frank E. Weld, of the Naval Reserve base at Wold-Chamberlain Field, has received word from headquarters that an additional group of five to ten men will be admitted from Minnesota.

[H. A. LINDBERGH]

MORE land area and continued development of the kind now under way is the need of the St. Paul Municipal Airport, according to J. E. Sommers, Government airport specialist, who conferred recently with Commissioners Otto W. Rohland and John H. McDonald, City Engineer John Kelsey and Colonel L. H. Brittin, vice-president and general manager of the Northwest Airways, Inc. Mr. Sommers complimented St. Paul on progress made, and urged that every effort be made for continuation of work on increased landing area, runways and service facilities. He discussed with Colonel Brittin the establishment in St. Paul of customs and immigration inspection service in connection with the Northwest Airways' international airline from St. Paul to Winnipeg, and means of facilitating the service for the convenience of travelers.

THE municipal hangar and administration building to be constructed at the Duluth Municipal Airport under the supervision of the Department of Public Works at a cost of about $45,000, will be ready for use when the airport is dedicated during the first part of September. The tentative plans call for the erection of a frame-work of brick and steel this year and the completion of the structure in 1931. Provisions have been made in the plan of the administration build-

(Continued on next page)

Boeing Air Transport
Canadian Colonial Airways
Colonial Air Transport
Colonial Western Airways
Embry-Riddle Company
Interstate Airlines
National Parks Airways
Pacific Air Transport
Southern Air Transport
Standard Airlines
Universal Aviation Corporation
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9 A Receiver

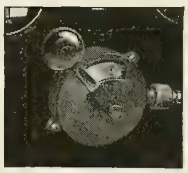
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(*Minnesota News continued*)
ing for rest rooms, waiting and baggage rooms, customs offices, radio and weather offices, a general administration office, kitchen, paint shop and dining room. Storage space in the hangar will accommodate about thirty small planes. The administration building will be fifty-seven feet by forty-eight feet. There is a door 120 feet wide by twenty-two feet high.

NEBRASKA

[J. R. LOWELL]

The Second Annual All-Nebraska Air Tour June 23-29

THE second annual all-Nebraska air tour was held June 23 to 29 inclusive, sanctioned by the National Aeronautical Association. More than fifty planes were entered in the tour, which started at Lincoln and ended in Omaha. Harry B. Sidles was chairman of the general committee in charge of arrangements for the tour. The other members of the committee were Dee Eiche, Eric Rogers, Joseph Lewis and George Smith. The Lincoln municipal airport was dedicated under the auspices of the Lincoln Post of the American Legion during ceremonies coincident with the start of the tour.

The schedule of the tour was as follows: Start at Lincoln, June 23; to Fremont for lunch; to Columbus for afternoon; to Norfolk for the night: second day—Niobrara, O'Neill and Valentine; third day—Chaldron, Alliance and Scottsbluff; fourth day—Ogallala, North Platte, and Broken Bow; fifth day—Holdrege, Kearney and Hastings; sixth day—Fairbury, Beatrice; seventh day— Nebraska City and Omaha. Stops were also made at Milligan and Hebron.

The tour was held for the purpose of interesting the public in aviation. Safety of flying was one of the first requisites demanded by the tour managers. Dr. G. E. Condra of the University of Nebraska made a motion picture film of the tour. The pathfinder plane, a three-place Spartan biplane, which visited the cities on the route prior to the tour, was furnished by the Skelley Oil Company and piloted by M. E. Callander of Tulsa, Oklahoma.

The Lincoln municipal field was dedicated with a three-day program ending June 23 when the tour started from Lincoln. A number of improvements costing about $18,100 were made at the field prior to the celebration. These included the installation of a water supply system, gravel parking for automobiles, and a concrete strip 1,100 yards long at the south end of the field so that planes may come in direct contact with the fueling pit. An old frame house was also remodeled to provide a lunch room and men's and women's rest rooms. Adequate drainage facilities to cost about $5,000, and 13,000 square yards of additional runway to cost $3,900, are to be added to the field this summer.

Rolla C. Van Kirk was general chairman of the American Legion committee in charge of the dedication. He was assisted by Marcus L. Poteet. Tom Woods was chairman of the publicity committee; Trev Gillaspie, chairman, concessions; Phil Hall, chairman, speakers; Fred Putney, chairman, prizes; and Fred Strasser, chairman, finances.

THE Mutual Fliers club plans to move from the Lincoln Municipal Airport as the result of a lease made between the city and the Lincoln Airplane school, providing that no other school shall operate on the field unless it complies with Department of Commerce rules relative to hangar facilities and equipment. The club, one of two tenants on the field, paid $130 for occupancy during the year just completed. It has two ships and a temporary hangar housing one ship. The organization licensed sixteen men under Government tests during the past year, and during that time had seventy flying students enrolled. The city will grant the club an extension of time if it complies with Department of Commerce rules immediately, which include the erection of a permanent hangar and the addition of several more ships.

TWO beacon lights were installed on the United States radio monitor station at Grand Island, during June. One, a million-candlepower obstruction beacon with a red light, was fixed at the top of the antenna to warn fliers over the overland route; the other, a 500,000-candlepower white light illuminates the sourroundings and points toward Grand Island's municipal airport.

A RESTAURANT, known as Port Inn Cafe, has been opened at Union Airport, operated by Sidles Airways, Inc., a mile north of Lincoln. Water mains are now being laid to this field.

THE National Construction Company of Omaha has been awarded a $125,000 contract by the Omaha city council for improvements on the municipal airport. The project calls for three runways 300 feet wide, to be constructed of compressed cinders and asphaltic oil. The runways will be 2,100 feet, 2,300 feet and 3,000 feet long, respectively, and arranged in triangular shape. Fencing and drainage are contemplated. The council recently purchased the lighting apparatus on the municipal field from J. E. Davidson, A. H. Fetters and Gould Dietz, for $25,849. These men advanced money to install the system before funds were available. By September 1, Omaha expects to have a well developed field. Boeing Air Transport and the Northwest Airways, Inc., plan to have the hangars at the field before that time.

BONDS for a municipal airport at Fairbury were defeated by a majority of eighty-one at a recent special city election.

OMAHA AIRWAYS, INC., has been reorganized with Lynn V. Hinshaw succeeding Andy Nielsen as president. John Kenwood is instructor and Emanuel Kenwood is chief pilot. J. P. Goggins is sales manager and will have charge of the mechanical work. The company, capitalized at $25,000, has three planes and plans to purchase two additional ships. Omaha Airways, Inc., has the agency for the Stinson-Detroiter. The company is seeking a dealer's franchise for a small sport plane. An office will be established at the Omaha municipal airport.

ORGANIZATION of the Omaha-Bellevue Glider Club has been completed, the first unit including thirty members. Officers are H. M. Gregory, president; Clifford J. Hotz, vice president; Robert H. Hotz, secretary; and D. O. Verety, treasurer. The board of directors include Maj. H. J. Houghland, Ralph Rohr and A. Moe. The club has purchased a Cessna glider from the Pioneer Aircraft Co., of Omaha.

[C. P. RODMAN]

EQUIPMENT has been installed on the field at North Platte which will enable Boeing officials to communicate by radio with pilots while in flight. A Federal meteorologist will be located here. A fifty-year lease has been granted the Boeing company by the North Platte city council.

AERONAUTICAL scholarships are now available to men students at the Nebraska State University. W. E. Boeing has ordered scholarships issued to one-third of the students in the undergraduates holding the highest record for the year. These will be honored by Boeing and a full practical course in flying given after close of each school year.

OVERLAND AIRWAYS, of Omaha, will build a ship for entry in the All-American air derby, sponsored by the Cirrus Company. The racer will be provided with taper wings, single-place cockpit and equipped with steel propeller, extra sized gasoline tanks and a supercharger, which develops 100 horsepower.

KANSAS

A ONE-PLACE light airplane powered with a two-cylinder engine of twenty-five horsepower will be produced commercially by the American Eagle Aircraft Corporation of Kansas City, Kan., according to a recent announcement of officials of the company. The plane will be known as the American Eaglet.

WICHITA

[E. W. PRYOR]

THE Wichita Glidette Club has been granted a State charter under the name "Women's National Gliding Association of Wichita." The club, formed "to provide social enjoyment for women interested in the art of piloting motorless planes," has a membership of twenty-nine. Membership is limited to thirty-two in Wichita. The officers are as follows: Margaret E. Crumplar, president; Betty Esswein, vice president; Wanda Cessna, chief flight commander; Vera Schubert, secretary; and LaVera Branscum. The board of directors include the officers and Margaret Casalou, Mrs. Elma Johnson, Mrs. Agnes McBurney, and Hazel Jeffries.

(*Continued on next page*)



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"NORMA-HOFFMANN" PRECISION BEARINGS

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NORMA-HOFFMANN BEARINGS CORPORATION STAMFORD, CONN., U.S.A.

(Kansas News continued)

FRED SWINSON was chosen president of the Pratt, Kan., chapter of the National Aeronautic Association at the annual election held recently. Other officers are as follows: S. P. Gebhart, first vice president; Theodore B. Noak, second vice president; and G. C. Shanholzer, secretary-treasurer.

A BUILDING has been acquired by United States Airways, Inc., at the municipal airport at Salina, Kan., to be used exclusively by the company. The building contains a waiting room, lunch room, and other facilities for passengers.

AN attempt to establish a new world's distance record in a glider is planned by D. Fechtman, pilot and aviation engineer of Wichita, according to a recent report. He has taken his ship to Colorado Springs, Colo., where he plans to launch it from a point 7,000 feet up on Pike's Peak. The craft, which he will use, has an enclosed fuselage and an exceptionally large wingspread. The world's distance glider record of ninety-three miles is held by a German pilot.

ORGANIZATION of plans for an air show to be included in the dedicatory ceremonies of the municipal airport at Hutchinson, Kansas, has been started by Arch E. Merriam, Kansas governor for the National Aeronautic Association. Col. H. G. Odell will aid him in the arrangement of the dedicatory program.

A. W. MOONEY, president of the Mooney Aircraft Company of Wichita, has been elected chairman of the Wichita chapter of the Society of Automotive Engineers. He succeeds Mac Short, chief engineer for Stearman Aircraft company of Wichita. Other officers of the chapter are as follows: H. R. Brown, vice chairman; W. W. McCutcheon, secretary; and E. Wertman, treasurer.

IOWA

PRELIMINARY work on the new model Kari-Keen has been completed by Kari-Keen Aircraft, Inc., of Sioux City, Iowa.

The specifications of the new Kari-Keen ship are as follows: span, thirty feet; length overall, twenty-two feet, four inches; weight empty, 950 pounds; weight loaded, 1,535 pounds; high speed, 110 miles per hour; landing speed, thirty-five miles per hour; and climb, 920 feet per minute.

[R. W. MOORHEAD]

A NATIONAL aviation meet and aircraft show will be held in conjunction with the 1930 Iowa State Fair, according to a recent announcement of A. R. Corey, secretary of the fair board. Glider flights, air races, stunt flying, balloon-bursting contests and feature exhibitions will be included in the program to be given twice daily. Exhibitions will include the Curtiss Tanager, the Travel Air Mystery S, two planes equipped with apparatus for use in crop dusting, aircraft engines, a wind tunnel, model plane that visitors will be permittted to fly, and a group of planes showing the advancement in the design of airplanes.

SIX air shows in conjunction with the third annual Iowa good will air tour were included in the program of events, according to an announcement of George Yates, chairman. A glider was on exhibition and made several flights. Other events included stunt flying, races, balloon busting and dead stick landing contests. The tour was to start from Des Moines' Municipal Airport on June 16, and continue for seven days, visiting fourteen towns, in addition to Des Moines. Shows were scheduled as follows: Marengo, June 16; DeWitt, June 17; Emmetsburg, June 18; Red Oak, June 19, and Ottumwa, June 20.

AT the second annual air show held in Ames, Iowa, more than 10,000 persons were in attendance in spite of unfavorable weather.

ARTICLES of incorporation have been filed by the Carroll Flying Service of Carroll, Iowa. William Heithoff is president and F. M. Francis, secretary. The company is capitalized at $10,000.

THE Council Bluffs Airways Company has been incorporated at $10,000. The company will operate an aviation school. J. G. Coulter is president and Mabel E. Coulter, secretary.

ILLINOIS

AN aeronautical exposition will be held at the new Chamber of Commerce Airport, Danville, Ill., August 2-3, sponsored by the Danville Chamber of Commerce and the Danville Flying Club.

The purpose of this exposition will be to finance the airport. Events will include dead-stick landing contests, balloon-busting contest, airplane speed races, parachute drops and glider flying contest.

Passenger hopping will be permitted by all planes on the field under certain regulations.

LECTURES on international air law will be given August 6-19 by the Air Law Institute of Northwestern University, of Evanston, Ill. Authorities from England, France, Italy, Latin America and the United States will present a series of approximately fifty lectures on all phases of the law of the air.

In connection with the course on air law, the National Legislative Air Conference will hold a three-day meeting August 18-21 at Northwestern University.

MR. C. D. McCORMICK has been appointed advertising manager of the C. F. Pease Company, Chicago, Ill., according to a recent announcement of officials of the company. The company manufactures blue printing machinery, drafting room furniture and supplies.

THE Speedwing Senior, produced by the E. M. Laird Airplane Co., Chicago, is a development of the regular Speedwing model, powered with the 450-horsepower Pratt and Whitney Wasp engine. Preliminary tests of this new airplane indicate a speed of more than 200 miles per hour, when the ship is fitted as a single seater, the passenger cockpit being completely covered.

Two quickly interchangeable covers are provided for the two-passenger cockpit, located forward of the pilot's seat. One of these covers supports a windshield designed to give maximum protection without breaking the streamline of the fuselage. The other closes the cockpit completely, further reducing parasite resistance.

Two luggage compartments are provided in addition to fittings and special instruments.

[E. TILTON]

AN air circus was held June 7-8 at the Rockford Airport under the direction of Fred E. Machesney. Local business men coöperated in the organization of the show. More than forty planes participated in the aerial exhibitions. Planes entered in the various events held were classified according to power rating and closed courses were flown. Prizes were awarded the winners of the events.

MISSOURI

JACK WHITAKER, formerly vice president and general sales manager of the Szekely Aircraft and Engine Company of Holland, Michigan, has affiliated with the Nicholas-Beazley Airplane Company of Marshall, Mo. He will supervise the sales of the company's low-wing Barling NB-3 monoplane.

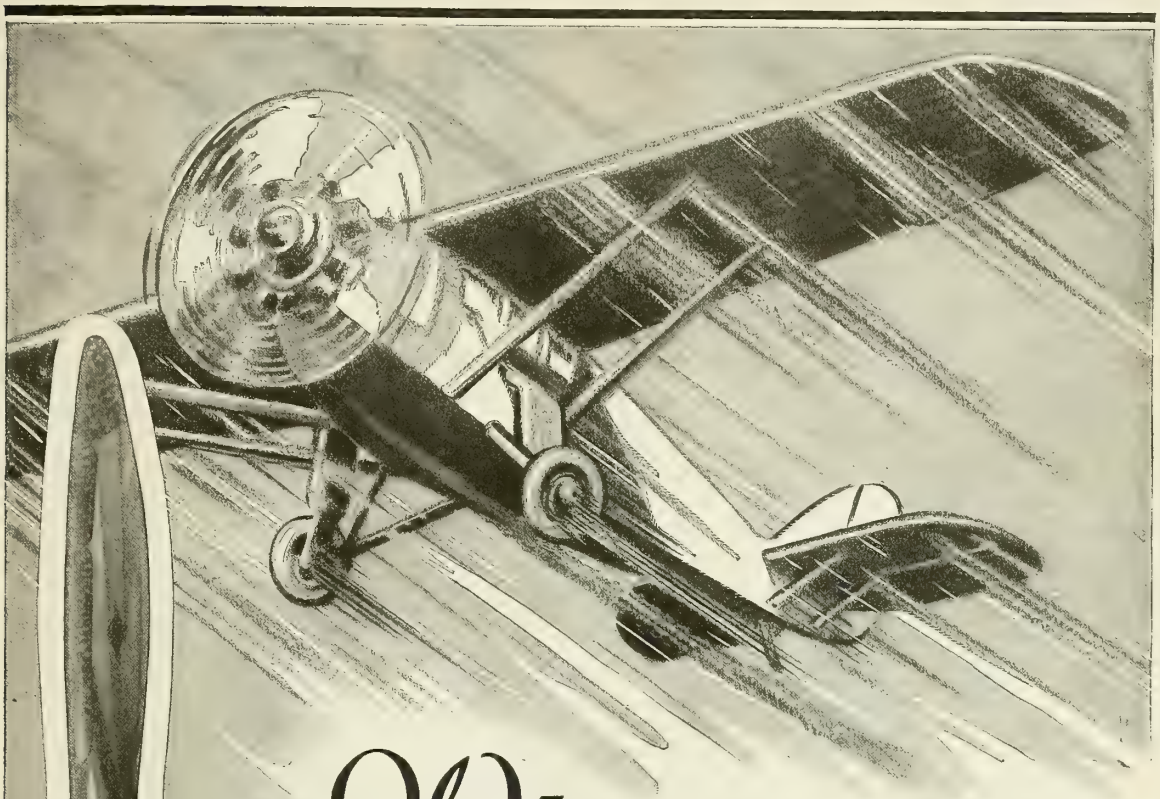
THE United States Department of Commerce has completed the work of installing instruments for the transmission of weather reports and data at the Nicholas-Beazley Airport at Marshall, Missouri. The airport is on the St. Louis-Kansas City airlines. Beacons and markers have been installed and the work of installing boundary lights have been practically completed. The weather reporting apparatus includes teletype telegraph printer, a ceiling projector, thermometers and barometers. The station will be manned twenty-four hours a day and will receive and broadcast weather reports to aircraft.

[M. SHEETZ]

CONSOLIDATED Airways of Kansas City, which is operating a branch school at Trenton, Missouri, recently conducted an essay contest there to aid in boosting for an airport. The subject of the essays was, "Why Trenton Needs An Airport."

MEMBERS of the 110th Observation Squadron, 35th Division, Missouri National Guard, recently flew from St. Louis to participate in a two-day celebra-

(Continued on next page)





When you grasp the stick and give'er the gun

Your motor responds with a welcome roar—a very short run and you're off the ground—and as you ease the nose of your ship higher and higher up into the blue, you can be sure you're getting the best your plane can give if she's Paragon equipped.

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There are Paragon Propellers for all aircraft. Illustrated pamphlet and prices sent promptly upon request.

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1100 So. Grand Ave.
Los Angeles, Calif.

(Missouri News continued)
tion at the Carthage Airport. Six ships of the squadron gave an exhibition of military maneuvers.

THE Neosho Airport was dedicated June 1. A number of ships from Kansas City took part in the ceremonies.

THE glider purchased by fifteen business men of Columbia has been assembled and glider instruction has been started. Flights will be made from the Allton Airport under the direction of R. F. Montgomery, airport manager.

ST. LOUIS

[A. W. LEAGUE]

IMPROVEMENTS at the St. Louis Municipal Airport are progressing satisfactorily. A new east and west runway on the south side of the airport will be ready for use within a short time. A concrete taxi strip and driveway are being constructed on the north side of the airport. Part of the concrete service road in the rear of the hangars has been completed and the new entrance and driveway will be opened within the near future. A dispensary has been established at the airport by the city and an effort is being made to have an interne regularly stationed there. A trained nurse is on duty at the dispensary. The flying rules and general regulations of the airport have been revised. Under the new regulations, all planes are required to use the full length of the field for take-offs. No cross wind take-offs are permitted and the signal for each take-off will be given by a traffic director who is on duty throughout the day. Approximately 40,000 gallons of road oil have been used to settle the dust on the landing area at the Municipal Airport. The tractors, trucks, mowers and other equipment used in keeping the airport in shape have been painted a bright orange, in an effort to make the apparatus visible to flying students.

THE Mound City Glider Club of St. Louis, composed of twenty members, recently purchased a glider of German design and established a Gliderport on a farm in St. Louis County.

A TOTAL of 285 passengers used the Southwest Air Fast Express service from St. Louis to cities in Oklahoma and Texas during the first fifteen days of May. The system of interchanging passengers with T.A.T-Maddux Airlines at St. Louis is proving satisfactory, according to reports.

A PUBLIC demonstration of two-way radio communication between the pilot of a plane in flight and a ground station was given recently at St. Louis. M. W. Swanson, communications engineer for Universal Airlines, flying a trimotor Fokker over St. Louis, talked with the operator at the Iarways radio station at the St. Louis Municipal Airport. The conversation was picked up and rebroadcast.

THE dedication of the new Curtiss-Steinberg Airport, near East St. Louis, was held June 28-29. The aerial exhibitions were under the direction of the Curtiss Exhibition Company.

KANSAS CITY

[H. H. JAMES]

THE new administration building at Fairfax Airport has been opened to the public. While all the interior has not been completed, it was decided to open those parts of the building that were ready. The dining room and hotel facilities will be ready soon.

A CINDER runway, 300 feet wide and 3,500 feet in length, will be constructed at the Municipal Airport. Matthew S. Murray, director of public works, has asked for bids on the project. This runway will be from the southeast to the northwest corner of the airport.

THE Prine Aeromotive Sales and Service Co. has been opened at Fairfax Airport. Roy M. Prine is in charge. The company will service planes and distribute aviation supplies.

THE Universal Flying School has moved its office from Grand Avenue to 1107 Baltimore Avenue, sharing offices with American Airways.

E. E. PORTERFIELD, JR., president of the American Eagle Aircraft Corporation, is advocating a meeting of executives of the airplane manufacturers of the United States for discussing a coöperative advertising campaign to sell aviation to the layman. If the response from the executives is adequate, a meeting will be arranged for the forming of definite plans.

INDIANA

ALLEN-COX, INCORPORATED, of Terre Haute, Ind., was recently incorporated. The company will distribute Barling NB-3 planes in Eastern Illinois and Western Indiana. The officers of the corporation are as follows: Paul S. Cox, president; Bernard Allen, vice president, and Thomas Jackson, secretary and treasurer.

DEDICATION of the field of The Pullen Flying Service of Logansport, Ind., was held June 1. The field is one mile southwest of the business district of the city. The Indiana National Guard participated in the ceremonies. Aerial exhibitions included a delayed parachute jump and stunt flying.

FIRE of undetermined origin recently destroyed one of the storage warehouses of the Davis Aircraft Corporation, of Richmond, Ind. A number of Davis Monoplanes were consumed. The fire did not damage the main factory building and the production of planes will not be interrupted, according to Capt. Walter C. Davis, president of the Davis Aircraft Corporation.

ACQUISITION of 300 acres of land for a new municipal airport will be the first duty of the South Bend board of aviation commissioners, according to an announcement made by Mayor W. R. Hinkle. Adam O. Wilson will be chairman of the board. Other members are to be George Davies, Walter M. McInerny, and Stanley J. Chelminiak.

The site under consideration for the airport is located three miles west of the city on Lincolnway West.

THE Chevolair D-6 has successfully passed the Department of Commerce test and was rated at 165 horsepower at 2,175 revolutions per minute, according to a recent announcement of officials of Chevolair Motors, Inc., of Indianapolis, Ind. The four-cylinder model holds Approved Type Certificate 35. The four-cylinder and the six-cylinder Chevolair aircraft engines each have dual ignition, dual carburetion, two complete and independent sets of valves and two oiling systems.

KENTUCKY

[A. W. WILLIAMS]

ALTHOUGH attendance at the Kentucky Derby in Louisville was less this year than in 1929, and various transportation facilities reported less business than in previous years, there was an increase of approximately thirty per cent in airplane travel to the races. Fifty-five planes arrived in 1929, as compared with seventy-two this year. There was an increase of ten Army planes and seven civilian ships. There were fifty-eight private and fourteen Army planes in this year. Other than Army planes the ships which arrived were as follows: Stinson, ten; Travel Air, eight; Ryan, six; Curtiss Robin, five; Fairchild, four; Ford, three; Sikorsky, three; Cessna, three; Waco, three; Lockheed, two; Bellanca, two; Aristocrat, two; Laird, two; Commandaire, two; Stearman, one; Eaglerock, one; and Flamingo, one. Between 225 and 250 spectators came to Louisville by air for the Derby this year.

ASSISTANT ATTORNEY GENERAL JAMES GILBERT, Frankfort, Ky., on May 23 ruled that before Fiscal Courts in the various Kentucky counties may condemn or acquire lands for airports, they must secure approval of plans and specifications from the Kentucky State Airboard. The opinion was rendered at the request of Mayor M. S. Hollingsworth of Middlesboro, who stated that his city and Bell County had arranged levies to raise funds for the airport, and asked whether plans should be submitted before condemnation proceedings were entered.

THE Lincoln Bank and Trust Co., Louisville, Ky., has asked the City Building Department for permits to install aerial beacons on a tower erected on the roof of the company's building. One is a revolving light of 8,000,000-candlepower, and the other a stationary light, with a beam of 1,700,000 candlepower.



International News Service

KEEPING PACE WITH THE NAVY

THE annual Curtiss Marine Trophy Race, Navy speed classic, was won this year by Captain Arthur H. Page, U.S. M.C. Flying a Curtiss F6C-3 Hawk (1926), powered with a Curtiss D-12 engine, he established a new speed record for the event of 164.1 M.P.H. This is the fourth successive year that the race, which is open only to standard Navy Service types, has been won by a Curtiss single-seat fighter (three of the four with D-12 engines).

Now, in the two-seater class, Curtiss presents the new F8C-4 "Helldiver." Fast, maneuverable, and rugged, it combines the new functions of a diving bomber with those of a two-seater carrier fighter, keeping pace with the rapid development of Navy fighting tactics. It is being built in quantities for the Navy and the Marine Corps.



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Offices: Garden City, N. Y. · Factories: Garden City and Buffalo, N. Y.

A DIVISION OF CURTISS-WRIGHT CORPORATION

TENNESSEE

[R. F. ASH]

THE first of the new Waco ATC-311 biplanes to be delivered in the Memphis territory was sold recently to Greek P. Rice, Clarksdale, Miss., attorney, by Southern Aviation Transport Company located at the New Bry's Airport.

F. R. BOULDIN of Columbia, Mo., field organizer for the American Model Aircrafters and Gliders Club, has started the organization of a chapter at Union City. He is assisted by Noah Henline of Memphis, who is field organizer for Tennessee, Mississippi and Arkansas. The Rev. R. J. Hunter, Jr., will be commander of the club at Union City and will be assisted by a local advisory board which includes Howell Bransford, president of Union City Lions; C. E. Keiser, president of the Chamber of Commerce; J. S. O'Sullivan, O. W. White, manual training teacher; T. E. Wallace, principal, Junior High School; Chas. Dietzel and C. G. Guill.

A MEETING of the advisory board of the State division of aeronautics was held June 17 in the War Memorial Building, Nashville. At the meeting a map showing airports and emergency landing fields of the State was presented. The map was prepared under the direction of the State Highway Department.

The board, created by an act of the last legislature, has an appropriation of $50,000 yearly. It is composed of R. H. Baker, State Highway Commissioner, and chairman of the board; J. W. Canada, Larry W. Hughes, John Outlaw, Herbert M. Toomey, Albert S. W. Williams, and W. R. Wooldridge. Commissioner Baker and Adj. Gen W. Caswell are ex-officio members.

ALABAMA

THE city of Birmingham has passed a regulation requiring each company and individual engaged in commercial aviation within the city limits to pay a $50 annual business license, according to a recent report. These companies are required to operate at privately owned fields.

AN aerial ambulance service has been inaugurated by Johns, Birmingham funeral director, in conjunction with Davis Air Lines, Inc. A Travel Air provided with a bed for the patient and seats for attendants is used.

[O. G. JONES]

BATES FIELD, the Birmingham Municipal Airport and one of the first large city-owned airports in the State, will be enlarged. An additional fifteen acres on the northeast side were purchased recently at a cost of $3,875.

City officials contemplate other expansions in the near future. A twenty-five acre plot of land on the southeast side of the field will be added, according to tentative plans. Installation of flood and boundary lights will be made at this field when the city completes financial arrangements.

THE Birmingham Chapter of the N.A.A. will in the future be known as the Birmingham Aero Club. However, affiliation with the national organization will not be severed.

TEXAS

[C. MORRIS]

DAILY passenger service has been inaugurated between Dallas and Los Angeles, with the point of junction at El Paso, by Western Air Express. Trimotor Fokker planes are used on the new line. Jack Frye, operations manager for the district, with a staff of eight men, has been stationed at El Paso municipal airport. William Kingsley has been named district superintendent of the new division. Planes from Los Angeles arrive in Dallas at 7:30 and leave at 5 a. m.

AIRPLANES in Texas are not subject to State taxes as they do not use public highways, according to a ruling made by Rube Hanks, tax collector, and L. G. Phares, chief license inspector at Austin. Airplanes are also exempt for the same reason from the four-cent gasoline tax imposed on automobiles in Texas.

A COMPLETE preliminary survey of El Paso-Fort Worth airway, a link of the proposed transcontinental air mail route, has been submitted to the Department of Commerce for approval, by W. S. Kenyon, extension superintendent. The survey was completed in three months. Actual construction of the airway will begin soon after July 1. Plans call for beacons of 3,000,000-candlepower to be located at ten-mile intervals along the line; electric beacons every four or five miles; and landing fields along the route

INFORMATION on connections with scheduled air transport operations in the leading Texas cities will be included in future bulletins of the Missouri, Kansas, and Texas Railroad.

[R. THOMPSON]

CONTRACT for construction of a six-place all-steel hangar for McAllen-Hidalgo Airport has been let to International Derrick and Construction Co., of Columbus, Ohio, according to announcement by D. W. Webber, chairman of the airport advisory board. The contract price is approximately $5,000. The hangar will be set on concrete blocks and the floor will be either concrete or paved with street paving materials. The building will be fifty feet wide and fifty feet long and will accommodate six planes of average size.

THE chamber of commerce of Ballinger is completing the grading and marking of a landing field situated one mile north of the city limits and adjoining the highway.

NEW PUBLICATIONS

Brief Reviews of Texts, Handbooks and Novels of Aeronautical Interest

Everyman's Book of Flying

By ORVILLE H. KNEEN

"EVERYMAN'S Book of Flying," by Orville H. Kneen, is intended as a "condensed encyclopedia of the air." The book is written for the purpose of describing and clarifying the principles, construction and maintenance and operation of aircraft; principles of meteorology, navigation and flight instruments. The research, inventions and trends in aviation at the present time are summarized. The contents include a discussion of gliders and airplanes, principles of flight, Guggenheim Safe Aircraft Competition, the Packard Diesel aircraft engine, airplane and engine construction, servicing and repairing, opportunities in aviation, and ground school training.

Parachutes for Airmen

By CHARLES DIXON

THIS volume is written for the purpose of "fostering a reasonable consideration towards the parachute wherever aviation is stirring," and relates the development, construction and use of parachutes. The contents include the following: "Progress of the Parachute"; "Manual vs. Automatic Release"; "Modern Types"; "Packing and Maintenance"; "Latest Developments—The R. A. F."; and "Parachute Sensations." The text is illustrated with photographs.

Jump

By DON GLASSMAN

THE development and practical use of parachutes are described in "Jump" by Don Glassman. This book is a narrative history of the parachute from its first theoretical description in 1495 to the present day; and the Caterpillar Club, a mythical organization comprised of members who have made successful emergency jumps from aircraft. The material for this volume was obtained from the records of the War Department, histories, unpublished manuscripts and from interviews with members of the Caterpillar Club. The text is illustrated with photographs showing types of parachutes in addition to parachutes in use. The appendix contains a list of the record parachute jumps, roster of the Caterpillar Club, and accounts of jumps made for exhibition and test purposes.

Stunt Flying

By CAPT. RICHARD DUNGAN, M. C.

THE Gosport System of Flight Instruction is the basis of "Stunt Flying," by Capt. Richard Dungan, M. C. This volume is intended as a text book for student pilots and those engaged in any branch of advanced flying. It covers every phase of flying instruction from the first flight of a student with an instructor to advanced acrobatics and flying in all types of planes.

(*Continued on next page*)

TO BE POSITIVE

(As Western Air Express is—)

STEARMAN

"Ifs" and "buts" don't go with Western Air Express. Ships must perform in perfect harmony with a sharply-set flying tempo. . . . You'll find Stearmans in their service. (Several in continuous use for over two years.) ¶For everyday schedules or just that optional hop of yours which has to pack a world of exhilarating yet restful pleasure into every minute —for every flying reason, what but Stearman! There's no question about it. 225 H. P. Business Speedster; 300 H. P. and 400 H. P. Junior Speedmail.



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STEARMAN AIRCRAFT COMPANY, WICHITA, KANSAS

Division of United Aircraft and Transport Corporation

Junior Speedmail, Model 4-D, Wasp Junior powered, in Western Air Express service

(*Continued from preceding page*)

Air Conquest

By W. JEFFERSON DAVIS

"AIR Conquest," by W. Jefferson Davis, was awarded the $1,000 Aeronautical Publcation Award for 1930 by the Aero Educational Research Organization for the most timely contribution to aeronautical literature. This volume discusses the airlines in the United States and Europe including the type of equipment in use, airport facilities, and air-rail and air-steamship services. Schedules and routes of companies operating air transport passenger services at the end of 1929 are given. The table of contents includes the following: "The New Era in Flying"; "Air Rambling Through Europe"; and "Aviation at Home and Its Future."

Wings Around the World

By F. K. BARON VON KOENIG WARTHAUSEN

"WINGS Around the World, by F. K. Baron von Koenig Warthausen, describes the 'round-the-world-flight which he completed in 1929 using a German-built Klemm monoplane powered with a twenty-horsepower engine. The flight started at Berlin, Germany, the first leg being completed at Moscow in fifteen hours for which Baron Warthausen was awarded the Hindenberg Cup. The book narrates the experiences encountered on the trip which continued from Moscow to Yokahoma, and from San Francisco, Calif., to New York and Germany, the crossings of the Pacific and Atlantic Oceans being made by steamer. The book is illustrated with photographs taken on the flight.

Contact

By ELLIOT WHITE SPRINGS

"CONTACT," a novel by Elliot White Springs, is the story of a young American in the United States Army Air Corps during the World War. Although places and events are authentic, the principal characters are fictitious, according to the author. The book is intended as a work of fiction which depicts the psychology of the pilot engaged in war flying, the author's own experience in the air service acting as a background rather than the basis of the plot. The principal source of the novel is letters written by the author during the war depicting "everything from the answer the wounded Tommy gave the Queen to the sound of a machine gun at 18,000 feet."

Skyways

By GENERAL WILLIAM MITCHELL

WRITTEN in non-technical language, "Skyways," by General William Mitchell, is intended for those generally interested in aeronautics. Included in the contents are discussions of practical flight; piloting a plane; aircraft and aircraft engine construction; flight instruments, meteorology; aerial photography; qualifications of airplane pilots; airports and airways; aviation insurance; commercial and military aviation and sport flying; and aviation in the future. The book combines an exposition on present day aeronautics with a general review of the history of aviation.

TRADE LITERATURE

NEW PAMPHLETS AND BOOKS OF INTEREST TO THE AERONAUTICAL INDUSTRY

Piston Ring Specification Book

THE 1930 edition of the "Piston Ring Specification Book" has been prepared by the American Hammered Piston Ring Company of Baltimore, Md. The booklet contains instructions for the installation of piston rings and specifications of airplanes, automobiles, trucks, buses, and motorcycles, in addition to specifications of junk rings used in sleeve valve engines.

Apex Machine Company Booklet

THE Apex Machine Company of Dayton, Ohio, has started the distribution of a new catalog describing the types of quick change chucks, positive and friction driven, for single and multiple spindle operations, manufactured by the company. The booklet contains in addition descriptions of full and semi-floating holders, floating tap steeves, and universal joint nut setters, made by the company.

Use of Caterpillar Tractors at Airports

"AIRPORTS and Airways," describing the uses of Caterpillar tractors in the aeronautical industry, has been published by the Caterpillar Tractor Company of San Leandro, Calif. The booklet contains photographs and descriptions of Caterpillar tractors in the field illustrating their utilization in the construction, maintainance and operation of airports.

South Bend 18-Inch Precision Lathe

PUBLICATION of Bulletin No. 18 has been announced by officials of the South Bend Lathe Works of South Bend, Indiana. The booklet contains descriptions and illustrations of the 18-inch 1930 new model South Bend back geared screw cutting precision lathes and attachments manufactured by the South Bend Lathe Works. The pamphlet contains sixteen pages of text and illustrations which are done in two colors.

Precision Bearings for Safe Flying

THE Norma-Hoffmann Bearings Corporation has prepared a booklet entitled, "Precision Bearings for Safe Flying." The contents, which are illustrated with photographs and drawings, include discussions of the place of precision bearings in the aircraft industry; applications of anti-friction bearings in aircraft construction and aeronautical equipment; bearings for landing and tail wheels; ball bearings for control pulleys; ball and roller bearings for engine crankshaft and connecting rods; propeller thrust bearings; bearings for engine rocker arms; supercharger bearings and bearings for electrical accessories. In addition, the booklet discusses bearings for flight instruments and miscellaneous applications of anti-friction bearings; and contains a list of bearings made by the Norma-Hoffmann company for aviation service.

Aeronautical Engineering Coöperative Plan

INCLUDED in "Coöperative Courses, College of Engineering and Commerce, 1930-31" prepared by the University of Cincinnati, is a description of the course in aeronautical engineering given by the university. The coöperative course in aeronautical engineering consists of five years of work and offers training in the fundamentals of the design of aircraft and aircraft engines and in the operation of commercial aviation projects. Satisfactory completion of the course leads to the degree of aeronautical engineer.

Starrett Fiftieth Anniversary Catalog

A CATALOG commemorating the fiftieth anniversary of the L. S. Starrett Company of Athol, Mass., has been prepared and distributed by the company. The booklet contains 382 pages of text and illustrations describing the full line of approximately 2,500 tools, including steel tapes, hacksaws and hacksaw frames, manufactured by the Starrett Company. Improvements of Starrett tools which have been made since the publication of the company's previous catalog are described in addition to new tools which the company has developed.

Report of Ohio Bureau of Aeronautics

THE organization and operation of the Bureau of Aeronautics, State of Ohio, are described in the report of the activities of the organization in 1929 recently prepared under the direction of John M. Vorys, Director of Aeronautics of Ohio. The report contains an appendix listing the regulations of aircraft and airplane pilots in Ohio; the regulation of air-marking of towns for identification from the air; the Ohio municipal airport law; and the results of a survey of the aeronautical industry in Ohio, including the number and value of airports, air accidents in Ohio, aviation insurance and aviation schools.

Industrial Sewing Operations

"THE Needles Eye" is a house organ published monthly by the Union Special Machine Company of Chicago, Ill., for the purpose of disseminating information relative to new or improved methods of performing industrial sewing operations and to familiarize manufacturers including producers of aircraft with the use of various sewing machines. Included in the May issue of this publication is an article on the seaming of airplane wing fabrics.

Glider Pilot Log Book

PREPARATION of the "Glider Pilot Log Book" which enables glider pilots to keep complete records of flights has been completed by the Johnson Airplane and Supply Company of Dayton, Ohio. The log book is of vest pocket size and is bound in red or green kraft leather with gold lettering on the cover. Provision is made in the book for the entry of data on glider flights completed during approximately one year.



SPARTAN

changes your viewpoint

IF you have never seen hills that look like gopher mounds, trees like shrubs that cluster around diminutive farm houses . . . watched mile after mile of fresh green acres slip beneath you . . . then you have a different viewpoint awaiting you in the air. And, still more impressive, a surprise to know that the first time up you can fly a Spartan yourself. ¶ Even for veteran pilots a Spartan provides new experiences in flight. A Spartan cabin monoplane changes anyone's viewpoint about airplanes. It was built to do just that. It has a speed of more than two miles per minute . . . ample room for four persons . . . deeply cushioned seats upholstered in Wiese broadcloth . . . handy fittings by Ternstedt . . . and you can fly it hands off. ¶ Spartan craftsmen have dedicated themselves to the production of safe, economical aircraft . . . and in building Spartan airplanes they have lived up to every engineering ideal. But you will never appreciate the finer characteristics of a Spartan until you have flown one yourself. ¶ A booklet in colors describing the new Spartan cabin monoplane and three open biplane models will be sent on request. A demonstration by a factory representative may be arranged without obligation.

SPARTAN AIRCRAFT COMPANY
TULSA, OKLAHOMA



The Spartan C-4-225 is powered by the Wright "Whirlwind Seven." Standard equipment includes dual controls, metal propeller, booster magneto, starter, complete instrument panel, oleo gear, Bendix wheels and brakes, adjustable stabilizer, navigation lights. Spartan biplanes, fully equipped, are offered with the choice of three engines: Wright "Whirlwind Seven," Wright "Whirlwind Five" and the Comet.

MODELS

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CALIFORNIA TECHNICAL COLLEGE
San Diego California

(*Continued from page* 156)

either develop the collection or effectively make it fully useful." Dr. Alfred F. Zahm, Ph.D., was appointed to the Guggenheim Chair of Aeronautics and Chief of the Division of Aeronautics of the Library of Congress.

Having received from the Guggenheim Fund assurance of a liberal grant, Dr. Putnam, in the spring of 1929, took steps to form an aeronautic division in the Library of Congress and to provide personnel and material for it.

The national library was prompt to procure aeronautic collections in bulk or piecemeal; by purchase, transfer, gift or bequest; to become the centralized depository, in the United States, for the most effective working material, including books, pamphlets, manuscripts, prints, engravings, autographs, original drawings, and objects of art.

After negotiations in the spring of 1930, the Librarian purchased from Maggs Brothers, booksellers in London, the following four important aeronautical libraries, the Tissandier collection; the Hoernes collection; the Silberer collection; and the Maggs collection. This combination was regarded as the finest available library of its kind that could be purchased anywhere in the world.

At the time of this purchase, in April, 1930, the whole aeronautical collection in the Library of Congress, consisting of 9,327 volumes and pamphlets, was as follows:

Original Aeronautical Collection in Library of Congress, 3,113; Gaston Tissandier Collection, 1,800; Hermann Hoernes Collection, 783; Victor Silberer Collection, 895; Maggs Brothers Collection, 621; and Samuel Pierpont Langley Collection, 2,115.

The Tissandier collection includes works on the early history of aeronautics, including many Sixteenth and Seventeenth Century books by Lana, Borelli, Kircher and others. It contains approximately all the worthwhile aeronautic literature published in France up to 1900.

The Victor Silberer collection contains several long runs of periodicals and many books which the collector received as owner-editor of two aeronautic periodicals. Besides the modern books, there are several old and rare items, and many scarce pamphlets and reprints. Silberer's own books are included.

The Hermann Hoernes collection comprises the material for writing Hoernes' three-volume handbook of aeronautics, "Buch des Fluges." Like the Silberer collection, it has many periodical sets and numerous reprints and clippings from periodicals.

The Maggs Brothers, London booksellers, had issued in two parts a descriptive catalogue of books, engravings and autographs illustrating the evolution of the airship and the airplane. All of 621 volumes that remained of this Bibliotheca Aëronautica in 1929, save 197 items duplicated in the collections of Tissandier, Hoernes, Silberer, were bought by the Library of Congress in 1930.

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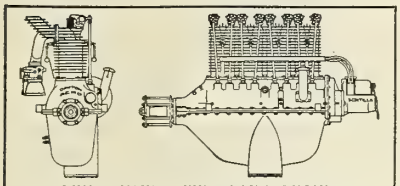
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The Samuel Pierpont Langley collection comprises the private aeronautical libraries of Langley and of James Means and the accessions added by the Smithsonian Institution through purchase or exchange. It is especially rich in complete files of important aeronautic periodicals.

Among the antiquarian items in these collections are included original manuscripts of the Montgolfier brothers, inventors of the hot air balloon.

LAUNCHING OF GLIDERS

(*Continued from page* 115)

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FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

ITALY

A NEW world's non-refueling endurance record of sixty-seven hours and fifteen minutes was established at Monticello, Italy, June 2, by Maj. Umberto Maddalena and Lieut. Fausto Cecconi. They exceeded by one hour and forty-nine minutes the previous record of sixty-five hours and twenty-six minutes established in 1928 by the Germans, Johann Risticz and Hans Zimmerman.

The plane in which the record was established took off at the Monticello Airdrome at 5:31 a. m., May 30, and landed on the same field at 12:46 a. m., on June 2. The flight was made over a triangular course between the Monticello field, the Anzani lighthouse and the Flavis tower, north of the city.

They used a Savoia Marchetti land monoplane, S64BIS, constructed in the factory of the Savoia company at Sesto Calende, and powered with a Fiat 22-T engine of 550 horsepower. On the take-off, the plane weighed 19,296 pounds, including the weight of 1,722 gallons of fuel. The flight on which the new non-refueling record was established was the fourth attempt made by Major Maddalena and Lieut. Cecconi, three other attempts having been made during the last two months of 1929. Adverse atmospheric conditions were encountered throughout the flight.

AN international competition for light airplanes of the first category, known as the "Giro Aero D'Italia 1930," or Aerial Tour of Italy, will be held August 25-31, sponsored by the newspaper *Il Popolo d'Italia*. The tour will be under the supervision of the Royal Aero Club of Italy. Prizes totaling 300,000 lires will be awarded by the newspaper in addition to other cash awards and trophies. The tour is scheduled to depart from and arrive at the Airport of the Littorio, Rome.

The competition will be open to all members of the Royal Aero Club of Italy and to all members of foreign associations affiliated with the Federation Aeronautique Internationale and provided with the sporting license of the F. A. I. Aircraft participating in the tour must be in the possession of Certificates of Airworthiness according to the regulations of the C. I. N. A.

Practical tests to determine the efficiency and handicap of planes entered in the tour will be held at the Airport Littorio August 20-23, and points will be awarded the contestants on this basis. These will consist of an altitude test, the plane reaching the highest altitude receiving the greatest number of points and all aircraft being required to reach a maximum height of 2,000 meters; a take-off and landing test, and an examination of the touring qualities of the planes, including equipment, weight, and power plant. Planes will be handicapped according to the number of points scored short of the maximum.

The itinerary of the tour will be divided into four stages, all contesting planes being required to land at the specified points on the route on the specified day. The contestant having the smallest time will be declared the winner of each stage. The contestant having the smallest time for the entire course will be declared the winner of the tour.

THE sum of 718,000,000 lires (approximately $40,000,000) is included in the Italian aviation budget for 1930-31 which has been presented by the Minister of Aviation and passed by both houses of Parliament. Approximately eleven per cent of this sum (79,418,000 lires) is for civil aviation. The budget for 1930-31 represents an increase of 18,000,000 lires over the one for the preceding year. Of this increase, 17,300,000 lires is appropriated for civil aviation.

The appropriation for civil aviation is divided as follows: Subsidies for civil transport lines, 74,500,000 lires; competitions, experiments, flying clubs, 2,000,000 lires; supervision of civil airports, 500,000 lires; and meteorological services, 300,000 lires.

There were eighteen civil air transport lines in operation at the end of 1929. The total length of these routes at the end of this period was more than 8,284 miles; the number of miles flown over these lines during the year totaled 1,840,759; a total of 38,203 pounds of mail and newspapers was transported; 25,298 passengers were carried; and 281,512 pounds of baggage and express were transported.

In the four years since the beginning of commercial aviation in Italy, the length of routes in operation increased three and one-half times; the total distance flown, five and one-half times; the number of passengers carried, five times; the poundage of mail and newspapers transported, forty times; and the poundage of baggage and express, eleven times.



Fleet of Supermarine-Napier Seagulls Flying Over Hobart, Tasmania

ENGLAND

MISS AMY JOHNSON completed on May 24 a flight of 9,900 miles from Croyden Aerodrome, London, England, to Darwin, Australia, in nineteen days, the first solo flight made by a woman in a light airplane from England to Australia. She used a Gipsy Moth and carried no radio. From Darwin, Miss Johnson proceeded to Sydney, Australia, where she landed on June 4, completing the flight.

Miss Johnson took off at Croyden Airdrome at 7:45 a.m. on May 5 and arrived at the Asperne Airdrome, Vienna, a distance of 800 miles, at 5:50 p.m.

The itinerary of the remainder of the flight was as follows: May 6, Vienna-Constantinople, 800 miles; May 7, Constantinople-Aleppo, 550 miles; May 8, Aleppo-Baghdad, 470 miles, a forced landing of two hours being made as the result of a severe wind storm; May 9, Baghdad-Bander Abbas, 830 miles; May 10, Bander Abbas-Karachi, 730 miles, establishing a new record solo flight of six days from England to India, exceeding by two days the former record set by Bert Hinkler; May 11, Karachi-Jhansi, 740 miles, the destination being Allahabad, lack of fuel forcing the plane down at Jhansi; May 12, Jhansi-Allahabad-Calcutta, 690 miles; May 13, Calcutta-Insein, Rangoon, 650 miles, the plane being damaged in landing and repairs requiring two days to complete; May 16, Rangoon-Bangkok, 307 miles; May 17, Bangkok-Singora, 400 miles, the plane being forced down by severe storms en route to Singapore; May 18, Singora-Singapore, 470 miles; May 19, Singapore-Tjomal, 800 miles, a forced landing resulting from lack of fuel being made en route to Sourabaya; May 20, Tjomal-Samarang-Sourabaya, 200 miles, a day being spent at Sourabaya repairing the engine.

May 22-23, Sourabaya-Atambua, 900 miles. (Miss Johnson landed at Halilulik, twelve miles from the city. On May 23, she flew to Atambua); May 24, Atambua-Port Darwin, 500 miles, flying across the Timor Sea to Australia. Miss Johnson then proceeded to Sydney where she landed on June 4, completing the flight.

A NEW two-place light airplane made its first flight at Brooklands Aerodrome April 19. The plane, known as the D.W.2, was designed by Capt. K. N. Pearson. The ship is powered with an 85-95-horsepower Cirrus engine and has a landing speed of twenty-five miles per hour.

NATIONAL FLYING SERVICES, Ltd., recently announced that no landing fees will be charged for private aircraft landing at London Air Park, Hanworth. Visitors arriving by air will be made honorary members of the Hanworth Club for the day. Similar facilities at municipal aerodromes under the control of the company in the provinces will not be offered, owing to the fact that the municipal authorities require payment for landings, except by members of the N. F. S. flying clubs.

FRANCE

THE conditions under which the French government will lend financial assistance to private fliers and flying clubs were announced recently by the French Air Ministry. Subsidies will be given to individuals or organizations to purchase planes which must be of a type in existence for at least six years. The planes obtained under these conditions must not be used for profit other than engaging in competition for sport purposes, and may be loaned exclusively to French citizens.

These subsidies will be granted for planes manufactured after January 1, 1930, and subsidy for upkeep will be given for planes manufactured after June 30, 1930. A fixed premium of 8,000 francs (about $315) is allowed for a single airplane regardless of type.

GERMANY

[E. P. A. HEINZE]

THE German Air Board recently issued a report stating that the F. A. I. has recognized five German records as international ones. In Class C for landplanes carrying a load of 5,000 kilograms (11,025 pounds), Wilhelm Zimmerman established on April 10 a new speed record of 184.464 kilometers per hour (114.624 miles per hour) over a course of 100 kilometers (62.14 miles); and a speed of 172.290 kilometers per hour (107.06 miles per hour) over a course of 500 kilometers (310.7 miles). Zimmerman flew a Junkers G.38 over a closed circuit of 501.590 kilometers (311.688 miles) between Leipzig and Dessa on a flight of three hours and two minutes.

In Class C, second category for light planes (two-seaters up to 250 kilograms, or 551.25 pounds), Mrs. Margarete Fusbahn established a new altitude record of 4,614 meters (15,137 feet) on April 11 at Boblingen, Württemburg. She used a Klemm L-25 powered with a forty-horsepower Salmson engine and carried Herr Fusbahn as a passenger.

In Class C, first category for light planes (two-seaters up to 400 kilograms, or 882 pounds), Waldemar Voigt set a new altitude record of 7,521 meters (24,674 feet) on April 21 at Darmstadt. He used an Academic Flyer Group Darmstadt powered with an Armstrong Siddeley Genet Major engine of 100 horsepower and was accompanied by K. H. Kaulé, passenger. On April 23 Rudolf Neininger, using the same plane and the same engine, established a new speed record for planes in this class of 214.848 kilometers per hour (133.506 miles per hour) over a course of 100 kilometers. He was accompanied by Kurt Stark, passenger.

The all-metal Junkers landplane G.38 recently completed test flights and was allocated the registration number D 2,000. According to an announcement of the German Air Board, the F. A. I. has recognized the following performance of this ship as a new international record: In Class C, landplanes, carrying a load of 5,000 kilograms (11,025 pounds), and covering a distance of 200.636 kilometers (120.662 miles) in a closed circuit, a speed of 175.918 kilometers per hour (109.315 miles per hour).

THE preparations for the International Light Plane Tour are proceeding fast. Herr von Hoeppner, vice president of the Aero Club of Germany, which is supervising the organization of the event, recently completed an aerial tour of the route leading through Switzerland, France and Spain. He found it necessary to alter part of the route in Spain as originally planned, as the Seville-Albacete-Barcelona leg of the route does not offer adequate terrain for an emergency landing. The route is now to extend from Seville to Madrid and onward via Alcaniz to Barcelona. Alcaniz has what may be called an emergency landing field. This field will serve solely for replenishing the tanks of the machines on the tour.

There were 101 planes entered at the beginning of May. Of these, forty-seven are German, eight British, sixteen French, sixteen Polish, four Swiss and ten Spanish.

MESSRS. Raab-Katzenstein Airplane Works of Kassel have started the manufacture of steel furniture as a side line and will move from Kassel to Krefeld, where additional facilities are available. The name of the company has been changed to Rheinische Luftfahrt-Industrie G. m. b. H. vormals Raab-Katzenstein Flugzeugwerke. The manufacture of light planes and gliders will be continued by the company.

MESSRS. FOCKE-WULF announce the completion of the construction of a plane of the Ente type, on which the wing is mounted at the rear of the fuselage and the elevator and rudders in front. It will be recollected that the company built a similar machine several years ago. The advantages claimed for this type of machine are the improved aerodynamical efficiency arising partly from the engine and propeller being mounted at the back, and the minimum possibility of the plane turning over in a rough landing. Particulars of this machine, however, will not be available for some time yet.

THE Rhoen-Rossitten Society has published the regulations of the 11th International Sail Flying Competition to be held at the Rhoen Camp and vicinity August 9-24. This contest will comprise a practice and a performance competition. The scholarship competition for young sail fliers can not be carried through as in previous years, owing to lack of funds. However, premiums will be set aside for the best performances of young fliers achieved during the flights for the C certificate during the period from May 15 to August 17.

MUNICIPAL AIR TRANSPORT OPERATION

Success of Wilhelmshaven and Ruestingen Precedent for Similar Enterprises

By EDWIN P. HEINZE

MUCH interesting discussion and comment has been caused in Germany by the recently published report of the activities of the Wilhelmshaven-Ruestringen Air Transport Company, which began operations on May 17, 1928. The dual municipalities of Wilhelmshaven and Ruestringen on the shores of the North Sea near Bremen joined forces at the instigation of the local aviation club and developed a flying field in 1927. This field was finished on June 15 of that year when, in conformity with a contract, the Luft Hansa planes operated on scheduled service on the Hamburg-Borkum-Bremen-Wangerooge route stopped to take passengers.

For this service the two municipalities were required to pay to the Luft Hansa a subsidy of 10,080 marks ($2,400) for the first line, which was in service from June 17 to August 31, 1927; and 10,000 marks ($2,380) for the second line, which was flown from June 15 to September 16, 1927. During the entire period 112 passengers were carried on both lines. Passage on ships arriving at the field was invariably sold out so that no further passengers could be accepted. The subsidy amounted to 173.30 marks ($40.80) for each passenger.

The following year another airways company offered to fly on these lines using larger machines on which it was prepared to reserve two seats for Wilhelmshaven-Ruestringen. Also an offer was made for the inauguration of a ferry line to Bremen. The entire service, averaging two and a half months per line, would have required a subsidy of 50,785 marks ($12,080). Wilhelmshaven-Ruestringen together have about 80,000 inhabitants, and such an expenditure appeared rather unwarranted to them. Careful calculation then proved the possibility of establishing their own air service, requiring a subsidy of 28,000 marks ($6,670). An operating company was organized with a nominal capital of 20,000 marks ($4,460) shared equally between the two towns, but of which only 5,000 marks ($1,190) were paid in. The company undertook to organize an air taxi service at an annual cost which should not exceed the amount of the subsidy. As the sum of 5,000 marks was inadequate,

(*Continued on next page*)

(*Continued from preceding page*)

the company was granted a loan of 40,000 marks ($9,540) from a savings bank under the guarantee of the municipalities. This money was used to establish the organization and to purchase planes. The first ship obtained was a Focke-Wulf that started service on May 17, 1928. A staff comprised of a director, chief pilot who in addition served as manager, a mechanic and a clerk was engaged. This is the normal staff, but sometimes an extra pilot and mechanic are employed.

The company immediately ordered a second machine, a new Focke-Wulf. On the sixth day of its service, however, there was an accident necessitating the return of the plane to the factory. It could not be used again until September 18, when the flying season was practically over. For a few days a Junkers plane was chartered. In spite of the fact that the old machine alone was used to handle the traffic during the whole summer, the company in the first year transported 1,484 passengers, 1,208 of them traveling to definite destinations and the remaining 276 on short joy rides. Flying was continued to the end of the year.

Although the fares were considerably lower than those asked by Luft Hansa, the financial results were satisfactory. The first year of business closed with neither a loss nor a profit and all expenses had been defrayed by the subsidy and the income from fares. Flights were carried out on demand and at a time previously arranged with the passenger or passengers. Attempts were always made to induce several passengers for one destination to start together at a mutually convenient time. Such arrangements were generally made over the phone. For certain of the more frequented routes, fixed fares established were so calculated that with even only one passenger all expenses arising from the flight, namely the fuel consumption, cost of pilot, agent's commission and insurance, were at least defrayed. These main routes were given the preference in such a way that in the event a passenger desired to go on one of the bye routes when there were passengers for a main route he was required to wait. For the secondary or bye routes the fares were arranged on a mileage basis. In this manner it was virtually impossible to exceed the amount of the subsidy granted. The subsidy at all events covered the constant and fixed costs; what came in from the fares over and above the actual flying expenses was employed for increased amortisations.

In the 1929 season a more ambitious program was organized, and the subsidy was increased to 35,000 marks ($8,320). In this year the old four-place plane was withdrawn from service and replaced by a new Focke-Wulf plane accommodating six persons. The company now owned this ship and the four-place plane purchased the previous year. During the 1929 season, flights were made until the end of the year, as was done during the previous season. In 1929, a total of 1,525 passengers and 47,565 kilograms (100,000) pounds) of express were carried at moderate rates. The total distance covered was 62,492 kilometers (37,800 miles). The company reported a profit of 25,000 marks ($5,950).

In order to foster similar enterprises by other municipalities, the company has issued a detailed report of its operations containing much excellent advice and showing how to calculate costs and avoid pitfalls. Many German municipalities, having studied the success of Wilhelmshaven-Ruestringen, are said to be considering the possibility of inaugurating a similar service. The success of the enterprise as here described makes it seem probable that in the near future the company will become entirely self-supporting.

SPAIN

PILOTS Gomez Lucia and Eduardo Soriano flew the first mail and passenger plane of the recently established airline from Madrid to the Canary Islands. The plane took off at Madrid, landing at Casablanca, Morocco, Cabo Juby and Las Palmas, Canary Islands.

AUSTRALIA

AUSTRALIAN NATIONAL AIRWAYS, Ltd., has appointed Frank Cridland, Ltd., freight agents. The company began passenger, mail and express air transport operations January 1, 1930, and has maintained regular service without interruption, according to a recent report. From the inception of the Sydney-Brisbrane service at the beginning of this year, the passenger accommodations have been fully taxed. The journey from Sydney to Brisbane by air requires approximately five hours as compared with twenty-seven and one-half hours by railroad. C. Kingsford-Smith and C. T. P. Ulm are managing directors of the company.

THE General Aircraft Co., Ltd., of Sydney, has developed a three-place light plane powered with a "Hermes" engine. The ship is known as the "Genaco."

CANADA

THE McKee Trophy, which is awarded annually for the most meritorious flying in connection with the development of air transport in Canada, has been awarded to Captain W. R. May, chief pilot of Commercial Airways, Ltd., of Edmonton, Alberta, for his work in conjunction with the inauguration of Commercial Airways.

The line operated by Commercial Airways extends for more than 2,000 miles over the remote territory of Northwestern Canada, following the McKenzie River from Fort McMurray, where the railroad ends, to Aklavik on the shore of the Arctic Ocean.

Working in temperatures ranging below sixty degrees below zero, May and his associates transported more than five tons of mail and express on the inaugural flight made over the route last December. Service on the line has been maintained without interruption.

Bellanca Pacemakers are used by the company. These ships are mounted on floats during the summer months and on skis during the winter. An order for two additional ships was recently received by the Bellanca company, making a total of five of these ships in use on this line.

THE exclusive agency for Junkers aircraft in Alberta and British Columbia has been obtained by Leonard Miller and W. A. Joerss with headquarters at 1411 Dominion Bank Building, Vancouver, British Columbia. The headquarters of the Junkers company in Canada are located in Montreal and are under the supervision of Richard Beier.

[J. MONTAGNES]

OPERATION of the Eastern Canada air mail route from St. Louis, N. B., to Detroit, an air mail line of 1,624 miles maintained by Canadian Airways Limited of Montreal, was speeded up in June. New Stearman mail planes were placed in use on the route each carrying 600 pounds of mail.

THE opening of the field of Brantford-Norfolk Flying Club on June 6 was celebrated with the representation of most of the flying clubs in Ontario and Quebec. The official ceremony was conducted by J. A. Wilson, controller of civil aviation for Canada, whose official party flew down in three planes from Ottawa. An eighty-five-acre field with a half-mile runway was officially opened for the new flying club.

Canadian Aviation in First Quarter of 1930

DURING the first three months of 1930, seventeen private licenses were issued bringing the total to 370, and nineteen commercial pilots were given licenses making in all 370 commercial pilots licensed in the Dominion. The number of aeronautical engineers was increased by six, making 311 in all. Six new aircraft were registered making a total of 407 in Canada for commercial and private use. There are now seventy-one airports, one having been added to the list during the period.

Flying clubs during this period flew a total of 1,599 hours. Seventeen clubs flew during the winter months and six clubs were not in operation. A total of 305 new soloists were preparing for their examinations during this period at the various government-subsidized flying clubs.

The Montreal-Albany air mail service, operated by Canadian Colonial Airways, was maintained with an efficiency of 84 per cent during the first three months of the year. Seventy-seven flights were scheduled, sixty-four completed and three partly completed. A total of 134 hours were flown; 3,887 pounds of mail and fifty-nine paying passengers were carried. In all 13,025 out of 15,400 scheduled miles were flown. The average time for the trip on this route is two hours and one minute.

(*Continued on next page*)

FORT WORTH TAKES TO THE AIR



ALREADY the hub of Southwestern Railway traffic, Fort Worth is rapidly attaining a position of major importance as an aviation centre.

19 rail outlets radiate to all points of the compass and twelve air lines supplement this carrying service with twenty-four planes carrying 216 passengers and covering 20,000 miles daily. These air lines are operated by seven aviation concerns.

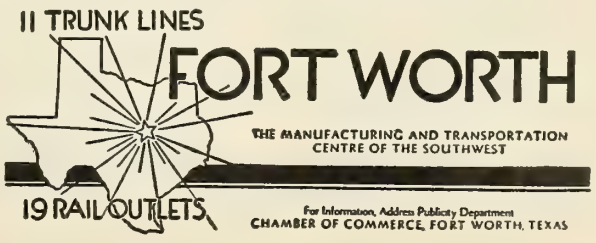
Meacham Field, Fort Worth's municipal airport, located 4 miles North of the center of the city contains 525 acres and embraces every modern flying facility.

Fort Worth is headquarters for the Southwestern Division of the Bureau of Airways. Government radio and weather service is maintained.

LOCATED opposite the airport on a federal highway, served by two railroads, with power, natural gas, water and sewer lines at its boundaries, is a tract of 100 acres owned by the City of Fort Worth, all or part of which is available for long time lease to manufacturers of airplanes and parts.

In the heart of the city of Fort Worth the new Aviation Building, sixteen stories in height, is now being completed. It will house the offices of a number of the aviation companies operating out of Fort Worth.

And next to come will be the manufacture of airplanes. The same production advantages which have made Fort Worth the leading manufacturing city of the Southwest will make this city an equally important producer of ships.





Hamilton All-metal Seaplanes ready for shipment to foreign countries. Made by Hamilton Metalplane Co.

(*Continued from preceding page*)

Canadian Airways and its subsidiary companies operating the mail from St. John to Detroit put in a total of 2,150 hours of flying time, with a mileage of 197,880 miles. Miles flown with mail totaled 176,150. The scheduled air mail mileage was at eighty-three per cent efficiency. The operating efficiency of the completed and uncompleted trips was 94.5 per cent; 159 mail trips were cancelled owing to adverse weather conditions; thirty-nine were partly completed for the same reason. The total air mail poundage carried during this period was 86,230 pounds; 836 passengers were transported.

Western Canad Airways Limited operating the new prairie air mail service, on March 3 had carried during this period a total of 8,274 pounds on this route which covers 2,500 miles daily. Combining all operations of the company, including those in the Northland and the Northwest territories, during the first three months of the year there was a total of 1,710 hours of flying time; a mileage of 159,029 miles; 1,408 passengers were carried; and 131,187 pounds of express and freight and 58,562 pounds of mail were transported.

The total poundage of air mail carried throughout the Dominion for the first quarter of the year was 144,897 pounds. There were fourteen routes in operation with a total mileage of 6,171½ miles.

The Ontario Provincial Air Service from the opening of its season in March to the first of June had flown a total of more than 2,500 hours with twenty-six planes operated in forestry patrol.

MEXICO

[M. HURST]

FOR the first time in the history of Mexican commercial aviation a flight, from Tejería to Mérida and return, in a Ford trimotor monoplane, was made recently by an all-Mexican crew. Rodolfo Torres Rico piloted the plane, Arturo Jiménez Nieto was co-pilot, and the operator of the radio was Manuel Herrera.

SAM E. JUDD recently made a tour of the fields of the Pan-American Airways to study the methods used at the many fields of the company with a view to putting them into operation at the field in Tampico. Included in the trip were Guatemala, Honduras, Cozumel Islands, Havana and Miami, Florida.

THE new airport at Bellavista, Leong Gto., was dedicated in May, planes of the Corporacion Aeronautica de Transportes, S. A., giving exhibitions, and civil and military officials assisting in the ceremonies. The field is near the city.

THE Mexican government will construct an airport with modern equipment at Matamoros, across the Rio Grande river from Brownsville, Texas.

WITH six hundred men working on the new Central Airport in Mexico City, which number will be doubled or tripled if necessary to maintain the schedule set, completion of the field will be accomplished in time for it to be inaugurated September 16. Construction of the administration building, which will house field offices and those of the customs, immigration, health and other government departments, the passengers' waiting rooms, and restaurants, has been practically completed. Towers for the beacons and field floodlighting systems have been erected, and the grading of the entire area has been completed. The cost of the central airport will amount to more than a million pesos.

ARGENTINA

THE Aero-Club Argentino has published a resolution of the Federation Aeronautique Internationale passed at the sessions held at Copenhagen last year, which provides that the next session of the F. A. I. be held at Buenos Aires, beginning August 5, 1931.

Delegates of the Aero-Club have received instructions to send invitations to representatives of the thirty-two countries affiliated with the F. A. I. of which the Aero-Club Argentino is the South American representative.

BRAZIL

FOLLOWING the transatlantic flight from Senegal, Africa, to Natal Brazil, completed on May 13 by Jearn Mermoz preparatory to the establishment of an ocean air mail service, officials of the Compagnie Generale Aeropostale announced that the establishment of regular weekly transatlantic air mail service is planned. For over two years Aeropostale has maintained a weekly mail service between Europe and South America, using airplanes and steamships.

As the result of the experimental flight made by Mermoz, mail which left the airport of Aeropostale at Toulouse, France, at 6 a. m., May 11, reached Buenos Aires, Argentina, at 7:25 p. m., May 14; and Santiago de Chile at 1:30 p. m., May 15.

The airplanes of Aeropostale transporting the mail on the experimental flight, covered the distance of 7,785 miles from Toulouse to Buenos Aires in eighty-five hours and twenty-five minutes at an average speed of ninety-one miles per, including all stops made en route. More than 1,900 miles of this distance was over water. The distance of 8,485 miles between Toulouse and Santiago de Chile, which included a flight at high altitudes over the Andes Mountains, was flown over in 103 hours and thirty minutes at an average speed of eighty-two miles per hour, including all stops.

PERU

[H. GOMEZ-CORNEJO]

A TOTAL of 2,971 passengers were carried by commercial planes operated in Peru during the period from June, 1929, to March, 1930. The total number of passengers carried each month during this period was as follows: 1929: June, 75; July, 96; August, 177; September, 215; October, 308; November, 338; December, 398. 1930: January, 358; February, 476; March, 530. During the period of operations by the Faucett Aviation Company; Pan American-Grace Airways and the Peruvian Naval Air line, a regular schedule has been maintained without a fatal accident.

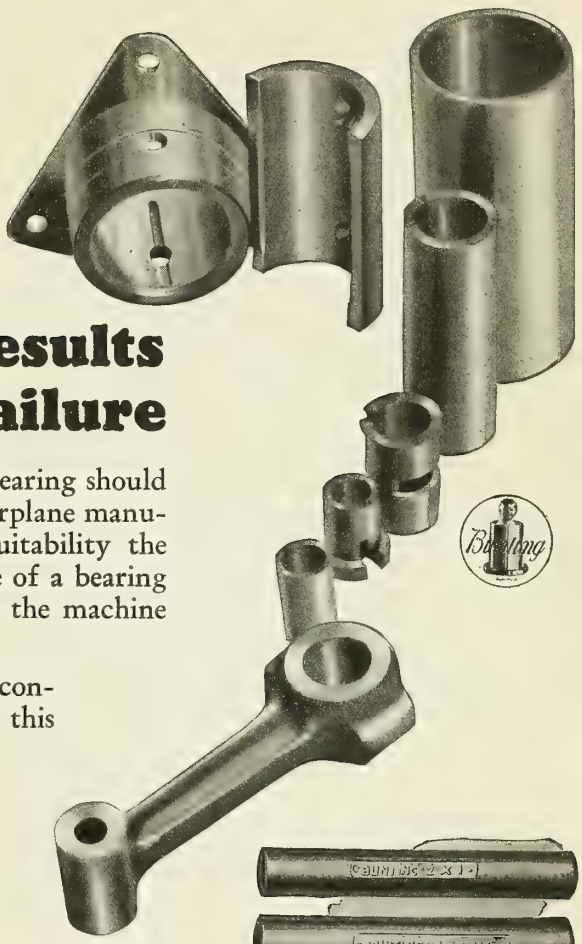
CUBA

PRESIDENT Machado has signed a bill modifying Article II of the Regulations for Civil Aerial Navigation, which had previously banned all aircraft from flying over the city of Havana after 3 p. m. The amendment went into immediate effect.

CUBA'S first aviatrix, Señorita Berta Moraleda, recetnly graduated from one of the classes at the Curtiss school, located at the General Machado Airport, which is owned and operated by the Cia. Nacional Cubana de Aviacion Curtiss.

BOLIVIA

THE Lloyd Aero Boliviano, which operates over the Bolivian territory to the frontiers of Argentina, Brazil, Peru and Chile, recently purchased two Junkers W-34 ships, powered with Pratt & Whitney Hornet engines. The company's facilities at Cochabamba have been enlarged by the addition of a hangar and a machine shop.



Avoid the Costly Results of Early Bearing Failure

It is now easy to find out exactly what kind of bearing should be used in any given application and why. The airplane manufacturer who makes scientifically determined suitability the first consideration in the specification or purchase of a bearing profitably safeguards the value and efficiency of the machine and the priceless asset of a good reputation.

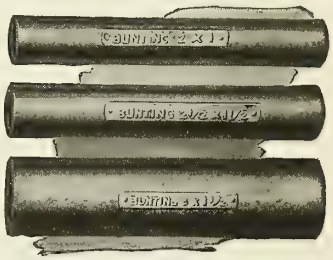
New bearing knowledge produced by the long continued and comprehensive research conducted by this company in collaboration with the United States Bureau of Standards and other scientific groups reveals how the airplane manufacturer can determine what are the essentials of bearing quality in his particular application, and how he can provide bearings that will harmonize with good engineering and conscientious construction.

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Write for detailed data.

ALTITUDE FLIGHTS DURING 1929

(*Continued from page 65*)

paratus was used, supplemented by an automatic rubber "lung" which will supply compressed oxygen to the lungs of the pilot under normal atmospheric pressure. In short, the apparatus was a sort of supercharging device for the lungs, a feature which now appears to be a real necessity in flights above 40,000 feet. At this elevation the air pressure becomes so low that, even when in the pure state, the normal flow of oxygen does not effectively regenerate the blood stream, with the result that the pilot after continued exposure suffers from oxygen starvation. When continued for a considerable time, unconsciousness, and finally death results.

The Junkers plane after taking off, climbed to 3,800 meters in seven minutes, 7,000 meters in thirteen minutes, 11,000 meters in twenty-nine minutes, 12,000 meters in thirty-seven and a half minutes, 13,000 meters in fifty-eight minutes, and the highest altitude 13,150 meters (43,143 feet) in seventy-two minutes. The above climb data are given in C. I. N. A. standard atmosphere. The lowest pressure attained in the flight was 126 millimeters of mercury, which is equivalent to 12,739 meters or to 41,794 feet in the F. A. I. standard atmosphere. This figure was, until Lieut. Soucek's flight on June 4, 1930, officially recognized as the world's altitude record for a landplane. (It will be noted that the C. I. N. A. ceiling value is roughly 3.2 per cent higher than that given in terms of the F. A. I. standard atmosphere.)

I have been especially interested in the method of testing the official barograph used by Neuenhofen and have written abroad for details. The answer thus far obtained has been that the instrument was tested according to the rules of the F. A. I. Much, of course, depends on the proper technique in testing the barograph. As has been previously stated, the F. A. I. regulations now in force do not require that the instrument during test be subjected to the low temperature obtaining in flight. Failing to test the barograph at the lower temperature may introduce an error equivalent to 1,000 feet at the 40,000-foot level, but in fairness it should be added that the altitude determined is usually higher when the common type of instrument is subjected to the lower temperature.

On May 28th, the late Miss Marvel Crossan took off from Los Angeles, California, in a Ryan Brougham monoplane powered with a Wright Whirlwind engine of 225 horsepower. The barograph carried in this flight, unfortunately, happened to have a clockwork that needed cleaning. The result was that the drum did not rotate when the starting lever was released and no climb trace was obtained. The stylus, however, recorded a single arc-like trace, the top extremity of which indicated the ceiling, so the flight, after all, was not made in vain. On checking this point of lowest pressure against a standard mercurial barometer, the pressure was determined to be 288 millimeters of mercury, equivalent to 7,314 meters, or 23,996 feet. This was an unofficial world record for women. The plane weighed more than 881 pounds or the record would have been considered official in a light plane class. Again, had the flight been made a month later, the record would have been considered official in a women's flight category.

On the morning of May 28th, D. S. Zimmerley took off with twenty gallons of gas from Parks Airport, East St. Louis, Illinois, in a Nicholas-Beazley Barling NB-3 low-wing monoplane, with a Genet radial motor of eighty horsepower. This attempt was made in order to establish a record for a light plane of the third category, that is, for a single-seat plane weighing between 441 and 771 pounds. Upon noticing that the oxygen supply was running low, the pilot descended, thereby sacrificing, possibly, a little additional altitude for the sake of safety. On calibration at the Bureau of Standards, the barograph indicated a minimum pressure of 331 millimeters of mercury, which is equivalent to 6,346 meters or to 20,820 feet. This was an American record for a light plane of the third category. Incidently, the same ship and pilot on July 17th made a world's record for a non-stop distance-in-straight-line flight from Brownsville, Texas, to Winnipeg, Canada. At this time a distance of 2,655 km. (1,649 miles) was covered. The same ship powered with a Lambert ninety-horsepower motor established on February 16, 1930, a world's record by attaining an altitude of 24,074 feet.

On June 2nd, Percival H. Spencer made a flight at Boston Airport, Massachusetts, in a Curtiss Robin cabin monoplane powered with a Curtiss OX-5 motor of ninety horsepower. This flight was made merely to determine the highest altitude obtainable with the plane. The highest altitude was reached after approximately two hours. The climb trace, recorded on a one-hour barograph drum, showed a fairly smooth curve, which became well flattened out at the top. Upon checking the barograph, the lowest pressure was found to be 363 millimeters of mercury, which is equivalent to 5,691 meters, or to 18,671 feet. Mr. Spencer's altitude flight in the Curtiss Robin bettered that made by the late Edward Devereaux in a similar ship and power plant by 2,300 feet.

Shortly after noon on June 4th, Lieut. Apollo Soucek, U. S. N., again took the air with forty gallons of gas in the Wright Apache, this time equipped with pontoons which converted it into a seaplane. Careful preparations were made by the pilot and others concerned, to make the flight a success. As before, two dual-traverse barographs with built-in temperature recorders were carefully suspended within the fuselage, and the air minimum-temperature recorder was installed on an outer strut. Mounted on the instrument panel was a special altimeter graduated in F. A. I. altitude, so that the pilot could easily note during his flight whether or not he had exceeded the former record for a seaplane. At the highest altitude many different maneuvers were tried in an attempt to obtain a little more altitude, but with varying success. The result of such maneuvering was well defined in the form of minute ups and downs in the upper part of the barograph trace. At the very top of the climb, the F. A. I. altimeter read 38,500 feet. At this elevation the free-air temperature was —58°C $\mp$2°C (—72°F), as recorded by the strut thermometer. Upon returning to sea level, a landing was made under perfect control on the Anacostia River. Then, after taxying to the shore of the air station, the pilot once more climbed out unaided—apparently none the worse for his adventure. A physical examination a short time later made by the flight surgeon showed him to be in perfect condition. The climb to the ceiling required seventy minutes, as compared with forty-eight minutes in the case of the landplane. The total flying time of the seaplane was one hour and thirty-six minutes. Upon examination of the official barograph on the following day at the Bureau of Standards, the lowest temperature attained by the instrument during flight was recorded on the smoked chart as —25°C $\mp$2°C (—13°F). The barograph was accordingly subjected to this temperature in the flight-history test. Upon checking the lowest pressure point of the trace

against a standard barometer, the pressure was found to be 147 millimeters of mercury, which is equivalent to 11,753 meters, or to 38,560 feet. This was a new world record for a seaplane, exceeding the former one made by Lieutenant Champion on July 4, 1927, by 565 feet.

On the afternoon of June 29th, Mrs. P. F. Omlie made a flight at the Moline Airport, Moline, Illinois, in a Monocoupe, powered with a Warner-Scarab engine of 110 horsepower. Upper air soundings at the meteorological station made that day with pilot balloons indicated ideal conditions for altitude flying. At the surface the wind was blowing from the southwest at eleven miles per hour; at 5,000 feet, west at sixteen miles; at 10,000 feet west by northwest at forty-one miles; and at 18,500 feet west by northwest at forty-three miles per hour. The climb continued for about two hours with the pilot taking oxygen now and then at points above the 16,000-foot level. When near the highest altitude, trouble was experienced with oil leaking and spattering on the wind-shield. Some time later, on landing, it was found to be due to a blown-out spark plug which lay hanging by an attached ignition wire. At the highest altitude, the ship's altimeter read 22,000 feet. On returning to earth, Mrs. Omlie found herself over Iowa City, Illinois, but she finally located her home airport at Moline and flew there for a landing—thus meeting an essential requirement of the F. A. I. When the barograph was checked, the lowest pressure was found to be 382 millimeters of mercury, equivalent to 5,324 meters, or to 17,467 feet. This was an official altitude record for women, since the flight took place after June 19th, when the F. A. I. established a category for women's flight records.

On July 26th, Waldo Waterman took off from Los Angeles, California, in a Bach Air Transport landplane powered with three air-cooled radial motors. In the nose of the ship was a Hornet of 525 horsepower, while at each side outboard was a J-6 Whirlwind of 300 horsepower. The ship carried 1,000 kilograms (2,200 pounds) payload at the time. An excellent barograph record showed a rapid, steady climb continued for about two hours with the climb curve pretty well flattened out at the highest altitude. On testing the instrument, the lowest pressure was noted to be 331 millimeters of mercury, which is equivalent to 6,346 meters, or 20,820 feet. Although this altitude was considerably short of a world's record, it was successful in establishing a new American record.

On August 23rd, J. Burtin made an important flight at Toussus-le-Noble, France, in a Breguet-19 landplane carrying 500 kilos (1,100 pounds) payload. The ship was powered with a Farman engine of 500 horsepower, supercharged by a Rateau supercharger. This flight was successful in establishing a world's record with payload. The minimum air pressure recorded was 212 millimeters of mercury, which is equivalent to 9,374 meters, or 30,754 feet.

On August 24th, Milton Harmon took off from Bridgeport, Connecticut, in a commercial landplane powered with a Curtiss OX-5 motor of ninety horsepower. A flight of two and a half hours was made to attain a maximum ceiling. The lowest air pressure of the flight was found to be 349 millimeters of mercury, which is equivalent to 5,972 meters, or 19,593 feet.

On August 28th, the late Kenneth Gale made an altitude trial at the Los Angeles Municipal Airport, Los Angeles, California, in a Campbell Super-Sport light airplane, powered with a Kinner motor of ninety horsepower. The climb as shown by the barograph trace was smooth and rapid at the beginning, with a decided flattening-out at the highest altitude of the plane, which was reached after two hours. On the descent, a step-like trace indicated that the pilot had leveled off for a while at several altitude intervals. On testing the barograph at the Bureau of Standards, the lowest pressure of the flight was found to be 391 millimeters of mercury, which is equivalent to 5,155 meters, or to 16,912 feet. This was considerably short of the long standing record for light planes of the first category—an official mark held for about two years by Captain and Mrs. De Havilland of England. They attained on July 27, 1928, in a Moth biplane powered with a Gipsy motor of eighty-five horsepower, a record altitude of 19,862 feet.

On September 5th, G. Fauvel took off from Le Bourget airport, Paris, in a light plane of the fourth category—a single-place ship weighing less than 200 kilograms (441 pounds). The ship used was a Mauboussin-Peyret monoplane powered with an A. B. C. Scorpion motor of thirty-four horsepower. At the highest altitude the pressure was 389 millimeters of mercury, equivalent to 5,193 meters, or to 17,037 feet. This was a world's record for an especially light type of plane.

On September 15th, Jack Frye made an altitude trial with a Fokker landplane carrying a payload of 1,000 kilos (2,200 pounds). The ship was powered with three Pratt and Whitney Wasp engines. Like the Bach flight on July 26th, a period of approximately two hours was required to reach the maximum height. The barograph of the Fokker plane had a trace which recorded a minimum pressure of 349 millimeters, which is equivalent to 5,972 meters, or to 19,593 feet. This was roughly 1,200 feet less than the American record set by Waldo Waterman in the Bach plane on July 26th.

On September 26, J. Burtin again took off from Toussus-le-Noble, France, in the Breguet-19 landplane powered with a Farman engine of 500 horsepower, supercharged by a Rateau supercharger. At this time the payload was increased to 1,000 kilos (2,200 pounds). Once more the flight was successful in establishing a new world's record. The pressure attained at the highest altitude was 257 millimeters of mercury, which is equivalent to 8,089 meters, or 26,539 feet.

On September 30th, Willfred G. Moore made a flight from Kansas City, Missouri, in an Inland Super-Sport monoplane equipped with a Warner air-cooled engine of 110 horsepower. The plane, being a two-seater weighing less than 881 pounds, fell within the light plane class of the first category. The trace of the barograph, recorded on a one-hour drum, showed a steady, rapid climb with the descent started well before reaching the zero rate-of-climb of the ship. The air temperature at the ceiling, as indicated by a liquid-in-glass strut thermometer, was —20°C (—2°F). Some time later tests were made on the barograph, which gave 365 millimeters of mercury as the minimum pressure, which is equivalent to 5,652 meters, or 18,543 feet.

On October 19th, Zwirko and Kocjan, at Warszawa (Warsaw), Poland, made a flight in a R.W.D.-2 light monoplane of the second category. The plane, a two-seater, weighed less than 280 kilograms (616 pounds), and was powered with a Salmson air-cooled motor of forty horsepower. The minimum air pressure attained in this trial was 457 millimeters of mercury, which is equivalent to 4,004 meters, or to 13,136 feet. It established a world's record for a light plane of the second category.

On October 25th, Willfred G. Moore once more took off from Kansas City, Missouri, in an attempt to better the altitude mark attained in his former flight. As before, the Inland Super-Sport monoplane was powered with a War-

(*Continued on next page*)

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(*Continued from preceding page*)

ner motor. Again compressed oxygen, contained in two small steel bottles, was carried by the pilot. The oxygen was automatically reduced in pressure and then passed through a flexible hose which terminated in a wooden mouth-piece. The latter was strapped securely to the pilot's helmet. The climb to the service ceiling of the ship required approximately one hour, but the flight was continued for an additional hour in order to obtain the highest possible altitude. The ship attained this point of the flight in about one hour and forty-five minutes after the take-off. The duration of the entire flight was two hours and ten minutes. At altitudes above 18,000 feet, the pilot took oxygen intermittently, increasing the amount until the descent was started. The air temperature at the ceiling, as noted by the pilot on reading a liquid-in-glass column strut thermometer, was five degrees above zero Fahrenheit. The only trouble experienced during the flight was that due to frost which formed on the goggles. Heavy deposits from the moisture of exhaled breath made it especially difficult to read the instruments. The barograph trace made on a recording drum which made one revolution in an hour showed a fine, steady climb to the ceiling. When the barograph, was tested, the pressure at the highest altitude was noted to be 348 millimeters of mercury, which is equivalent to 5,992 meters, or to 19,659 feet. This is now the American record. It is the nearest approach (within 200 feet) to the world record established by the De Havillands of England on July 27, 1928.

On the morning of November 18th, Miss Ruth Blaney Alexander took off from San Diego, California, in a Great Lakes landplane powered with a Cirrus air-cooled motor of ninety horsepower. Her endeavor was to exceed the altitude record established by Mrs. Omlie on June 29th. The barograph trace of the flight indicated a smooth, steady climb for a period of one and one-half hours. The air temperature at the highest altitude was noted by the pilot to be twenty-four degrees above zero Fahrenheit. The pressure at this point, determined several days later from a flight-history test made on the barograph, was 411 millimeters of mercury, which is equivalent to 4,791 meters, or to 15,718 feet. Since that time, Miss Elinor Smith in a Bellanca monoplane powered by a Wright J-6 engine of 300 horsepower, has established (March 10, 1930) an official altitude of 27,418 feet, which is now the world's altitude record for women.

EIGHT MILES HIGH

(*Continued from page 62*)

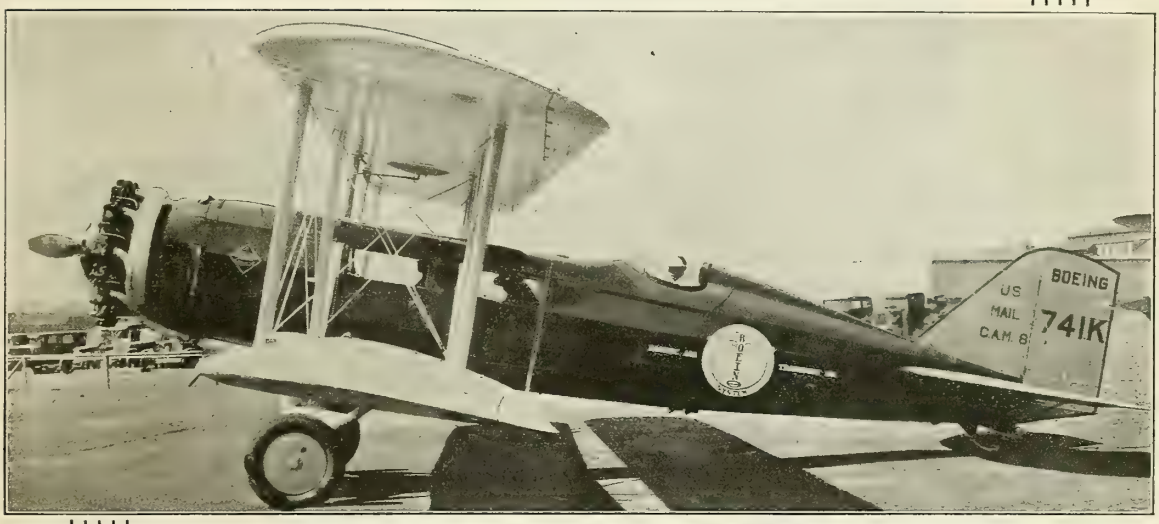
fortunately, the use of the battery involves the addition of its weight, eight pounds, to the equipment, which in a high-altitude ship obviously must be as light as possible.

Low temperatures have also long been a cause of difficulty with the oxygen apparatus of altitude fliers, because ice tends to form in the tubes. As a precaution against such trouble, Lieutenant Soucek worked out several improvements on this part of his equipment. Notwithstanding, he did experience some difficulty from this source, which may best be described in his own words:

"I had a sensation somewhat like that produced by smothering. I feared that the oxygen flow had stopped, but none of the sensations produced by want of oxygen was felt. Soon I discovered the trouble; the exhaust tube of the breathing device is a piece of corrugated rubber hose about one inch in diameter and two feet long. I felt of this hose, and was greatly surprised to find it as

(*Continued on next page*)

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—*first* to pilot a plane across the Atlantic; *first* to fly from North to South America; crack flying instructor for the Navy during the War; *first* and *only* world-famous flyer to offer you the knowledge and contact for success in ANY branch of Commercial Aviation. If over eighteen get his Free Book.

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A few years ago a lot of fellows saw *their* opportunity when the automobile and radio industries were young. They got in early and literally "cleaned up." Today thousands of those "early-birds" are wealthy.

That's the *kind of a chance* YOU HAVE in Aviation today. During the next few years Aviation is going to pick its bosses, its high-priced specialists, its leaders and executives. And YOU by LOOKING AHEAD and ACTING AHEAD—can be one of them.

What is more, to fit yourself for an important place in AVIATION—it isn't necessary for you to leave your home, give up your present job or spend a lot of money. Instead, give me just a part of your spare time during the *next few months,* and I'll give you the kind of training you need to qualify for a REAL JOB at REAL PAY! I'll do *even more!* I'll actually help you get a job. You will receive the *free* assistance of my Employment Department. This department is called upon for trained men to fill "ground jobs" and "flying jobs" that pay REAL MONEY and offer REAL FUTURES.

Get MY FREE Book



I have an idea that the only reason I'm not training YOU *right now*—just as I'm training hundreds of other ambitious men is because you haven't begun to appreciate what a tremendous opportunity Aviation offers you.

If that's so, I want you to have a copy of my book, "Wings of Opportunity." You'll find it crammed with interesting FACTS that are vital to YOUR FUTURE.

Before you decide to sit by and let Aviation grow up WITHOUT you—clip that coupon and tell me where to send YOUR COPY.

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Address..... Age.....
(Must be over 18)

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(*Continued from preceding page*)

stiff as a piece of wood. I bent it in my hands and rubbed the sides of it together to break up the ice that had formed from my frozen breath. At least a pint of ice in small chunks fell out in the bottom of the cockpit. I ought to explain here that this situation is not as bad as it may sound, for there was an escape for my exhaled breath even if the tube was frozen; had the ice remained unbroken, I could have breathed out around the mouthpiece into my mask by merely opening my lips and holding the mouthpiece in my teeth. For some unaccountable reason, I didn't do that; in fact, the breath under pressure was trying to force itself out around this very mouthpiece, and I resisted the escape by closing my lips tighter than ever. I suppose that I was so intent on keeping that most urgently needed mouthpiece in my mouth, that I refused to move it even for an instant."

Equally as important as combatting the effects of the extreme cold were the alterations on the plane and its engine—changes without which it would have been impossible to reach such an unprecedented altitude. While Lieutenant Champion was still engaged in altitude work for the Navy, the center of gravity of the plane was modified to obtain greater efficiency, and for several months previous to Lieutenant Soucek's flight of June 4, 1930, numerous other improvements were applied. The wings were recovered by the Chance Vought Corporation; to save weight, they were not painted after being recovered, but were merely doped. A new Pratt and Whitney Wasp engine, fitted with a better supercharger, special Stromberg carburetor, supercharged Scintilla magnetos and special B. G. spark plugs, was installed. The engine supercharger, which was produced by the Allison Engineering Company, is of the Root's type. In addition, a modified oil cooling system was used. It is quite evident that it was not an easy task to modify the power plant so that it would run consistently well in temperatures varying from eighty degrees above zero to eighty-nine degrees below.

One of the most important and yet most difficult problems to be solved had to do with the propeller. An airscrew was needed which would permit a safe take-off and good climb in the lower levels where the air is denser, but which would not lose too much of its efficiency in the thin upper air. To meet these requirements a type incorporating numerous compromises had to be developed. Had his flight failed of its goal, Lieutenant Soucek intended to try again with a different, and perhaps more efficient, propeller.

The contribution to military aviation resulting from this effort to improve the performance of the Apache is not so much that it makes possible a naval air fleet capable of flying at 40,000 feet, as that it serves as a laboratory from which many lessons have been learned which, when applied to service aircraft, will raise their ceiling and thereby add to their effectiveness.

THE VALUE OF NATIONAL AIR RACES

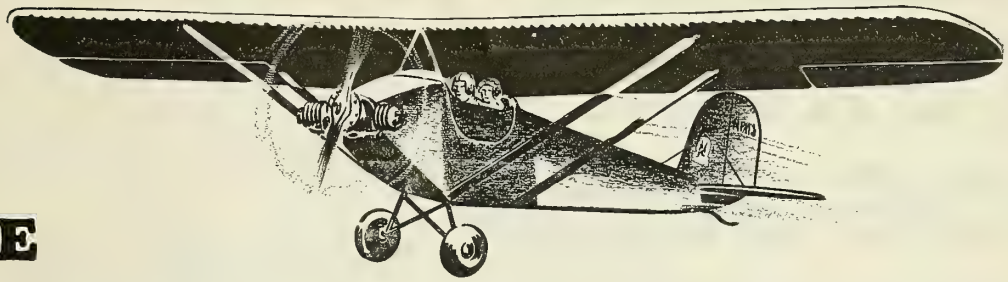
(*Continued from page 70*)

they have been reading about for years and see that they are flesh and blood, essentially no different from themselves, that fliers are not necessarily super-beings. They listen to shop-talk among these fliers. They acquire a real foundation for further interest.

And last but not least is the international publicity deriving from the event. No other industry in America can command the front pages of every newspaper in the United States and Europe for ten successive days. Such education

(*Continued on next page*)

ORDER NOW



THE AMERICAN EAGLET

The World's Foremost Two-Place FEATHERWEIGHT AIRPLANE

The American Eaglet, the newest sensation of the aviation industry, is a real featherweight airplane,—not to be confused with so-called powered gliders.

Powered with a twenty-five horsepower engine, the American Eaglet carries a pilot and one passenger.

Overnight it will prove the foremost trainer and sports plane. Constructed of steel tubing and with conventional type wings, it is a parasol type monoplane with a tandem seating arrangement. Controls are conventional in design and an air wheel landing gear of comfortable tread is provided.

Orders for this plane are pouring in now. Don't fail to get yours in early. Deliveries will be made in order of receipt of purchase agreements at the main office of the American Eagle Aircraft Corp., Fairfax Airport, Kansas City, Kansas.

Because of the instantaneous demand this featherweight airplane has created, only distributors and dealers handling the complete American Eagle line will sell this plane.

Distributors and dealers in the automotive industry now have a wonderful opportunity to engage also in the very profitable aircraft sales field. Wire us today for our proposition.

$1095.00

F.A.W. or F.O.B. Kansas City

(a slight extra charge for crating)

If you are interested in aircraft sales field activities—the real dollars in aviation—a franchise to sell the American Eaglet, the featherweight airplane which has taken the altitude out of the high cost of flying, is just what you have been looking for. To sell this ship you must be an American Eagle distributor or dealer handling the entire line. Wire us today for our proposition. It will mean dollars to you!

AMERICAN EAGLE
AIRCRAFT CORPORATION
FAIRFAX AIRPORT KANSAS CITY, KANS.
"MASTER OF THE SKIES"

AMERICAN EAGLET ORDER BLANK

I hereby place my order for ..... (Number) American Eaglet (s) and enclose deposit for same in the sum of $..... (at rate of $250 per plane) ..... this order to be filed and filled in rotation according to the date of receipt at factory.

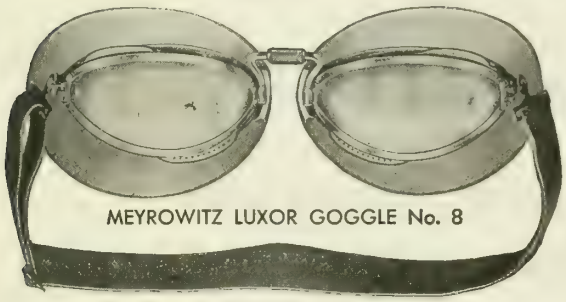
Name .....

Address ..... (Street) (City) (State)

It is understood that if I become an American Eagle Distributor or Dealer I may have a sales franchise covering the American Eaglet.

Now you can have

Non-Shatterable Lenses in Your LUXOR GOGGLES



MEYROWITZ LUXOR GOGGLE No. 8

...not in the plain window-pane type...not in the ordinary bent lenses, but in perfectly ground *spherically* curved lenses — providing absolute safety and correct vision for flier's eyes. Spherically curved ground lenses avoid disagreeable and dangerous distortion, blurring and reflection. They provide a correct and unusually wide angle of vision at all times and under all conditions. The combination of these features is a scientific achievement, perfected in the Meyrowitz laboratories—and will be found only in Luxor Goggles.

Never before has optical science achieved true spherically deep-curved ground lenses in non-shatterable glass.



Note the perfect curvature from end to end and from top to bottom . . . an absolutely accurate spherically deep-curved lens.

In addition to non-shatterable spherically curved ground lenses, the new Luxor No. 8 is notable for the new WIDE, FLARING FEATHER EDGE CUSHIONS which provide better protection with no pressure; DURALUMIN FRAMES for lightness and strength; MICRO ADJUSTABLE BRIDGE: NON FOGGING VENTILATING CIRCUIT to prevent sweating, fogging and to keep air currents and foreign matter away from the eyes.

THE NEW

LUXOR GOGGLES No. 8 — optically ground and polished lenses, either Army or Navy specifications $18

LUXOR GOGGLES No. 8 — with non-shatterable ground and polished spherically curved lenses $36

LUXOR, U. S. AIR SERVICE GOGGLES No. 6 and No. 7 — with non-shatterable lenses . . . . . $32 and $34

E. B. Meyrowitz INCORPORATED AND ASSOCIATED COMPANIES *Send for catalogue*

520 Fifth Ave., Dept., A., New York

(*Continued from preceding page*)

of the reading public is simply unpurchasable. Such publicizing is the result in part of the evolution of the races. This affair has progressed from highly technical starts and finishes, which the public found confusing, to race horse starts and other features of great exhibitions which have established precedents on race-tracks and motor speedways. The races recognize new public interests in aeronautics, lighter-than-air, gliding, every phase of the entire field.

Every class of race has one free-for-all event. That is the wide open invitation to the industry to improve and advance aircraft design. It is opportunity for the large and small manufacturer, the inventor with radical ideas, to demonstrate before an expert, as well as a lay, audience the thing he has to offer. That fact alone is justification for the air meet.

That's the Why of the National Air Races!

THE FASCINATION OF FLIGHT

(*Continued from page* 58)

the sky on pleasure or business. I suppose he gets another satisfaction which I know nothing about, from handling and controlling the powerful machine in which he flies, but he also enjoys the extraordinary freedom of the air, the wide range of vision and the curious patterns of the world below very much as I do.

The fascination of flight is one thing that is new in a world which is always repeating itself. It takes some experience, of course, to get the full flavor of it. The average citizen on his first flight is freezing too tight to his seat and thinking too hard on his sins to enjoy himself altogether as he should. Every time the plane goes over a bump he swallows his tonsils, and whenever the pilot turns a corner he remembers that his insurance premiums are overdue. He shakes with every strut and shifts his gum to trim ship with every bank turn. He listens to the motor as though he knew its language, and watches the pilot like a mother-in-law.

But by persistence he may get over this mild form of paralysis and discover for himself the fascination of flight. It is an unprecedented sensation, not only for the individual but for the race to which he belongs. Only in the last lifetime have men gone away from earth to look at her, except for the few who have swung in space in a balloon basket. This generation that flies has seen things that no human eyes have seen since the dawn of time. It has discovered a new aspect of the familiar earth, a new scale of distances and proportion, a new pattern in nature and in the affairs of men. It has created for itself a new sensation of lofty solitude, of mastery over space, of infinite horizons. I recall one unusual aerial trip which sticks so fast in memory that it may be worth telling. It may, in fact, be worth imitating, if you have exhausted the ordinary novelties of the sky.

It was, in effect, a visit to Fairyland. You may suppose that there is no such place, but I have seen it. It lies neither in heaven nor earth, but hangs miraculously in its own element. It is a land fashioned and shaped in mountains and valleys, caverns and ravines; solid and substantial and yet blown to nothing at a breath of wind; cold and white and innocent, yet bearing the deadly lightning in its heart. It is a mile away from you on a summer's afternoon, yet in a thousand centuries no human eye had seen its marvels. It is created today and gone before night, to be re-created again in the heat of an August day. And I have seen it,—not by bewitchment nor by special privilege, but by the might and magic of the gasoline motor and the skill of the

(*Continued on next page*)

... they reward Courteous Service with LUXURIOUS FLYING



Executives of the Walgreen Drug Stores use the Company's Sikorsky Amphibion to save valuable travel time when visiting branches, and particularly efficient salespeople in the Company's employ are rewarded with flights in the ship



Mr. C. R. Walgreen, executive head of the Walgreen Drug Stores

WHENEVER a great business spreads from city to city, and from state to state, its growth brings with it the problems of supervision. And that means travel time. In the management of the Walgreen Drug Stores the Company's Sikorsky Amphibion plays a vital and time saving part.

Not so long ago it became necessary for Mr. Walgreen and three of his department heads to visit several branches. Leaving the home office in Chicago they flew to Denver and back in four days, stopping at Des Moines, Omaha, Lincoln, Wichita and Kansas City. Their Sikorsky provides fast, luxurious transportation.

Tactful and efficient salespeople in the Walgreen Company have also learned to know and enjoy the big Amphibion. When shoppers report an employee as being particularly courteous, the good work is rewarded with a ride in the "S-38."

This Sikorsky Amphibion is unusually well adapted to the use of large business organizations. The ship is powered with two 420 H. P. "Wasp" engines, which give her a cruising speed of 110 miles an hour. And so large is her reserve of power that she can fly and maneuver on either engine. Further, it requires but a few seconds to convert the ship from seaplane to landplane. She takes off and alights on land or water with equal facility. Many cities have fine water fronts almost within a stone's throw of their business centers.

There's a booklet which tells more about these advantages of the Sikorsky Amphibion. May we send you a copy? Sikorsky Aviation Corporation, Bridgeport, Connecticut. Division of United Aircraft & Transport Corporation.

From the window of the comfortable and speedy Sikorsky Amphibion the Chicago lakefront looks like this. Note the nearness of water landing places to the center of town. Photograph from Fairchild Aerial Surveys



SIKORSKY AMPHIBION

How to Get into AVIATION *and make good*





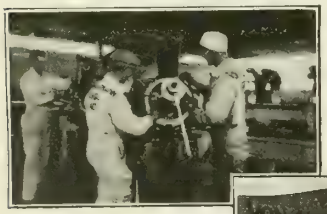
Of all the Von Hoffmann graduates making good in Aviation, many were in the same position a year ago as you are now. They had the ambition and determination to enter this most profitable field and make good.

They selected this school because they knew Von Hoffmann graduates are recognized in the Industry as outstandingly well trained. The training they secured assured them of success.

This is why their early dreams are a realization, and they are now piloting, building and repairing airplanes—holding responsible positions at good salaries.

Von Hoffmann courses generously exceed Government requirements. Training is given on late types of planes, and most modern and complete ground equipment, at reasonable prices. If you need it, a liberal Time Payment Plan is available.

Mail the coupon and learn how to make your start on the road to a successful and prosperous career —NOW!



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[ ] WELDING COURSE [ ] HOME STUDY

(*Continued from preceding page*)

airplane pilot.

Come with me, then, on a flying visit to a thunder cloud. The field below is in open sunshine, but above its horizon there is gathering a summer storm. Not yet the blanket of gray that blots out the golden light, but here and there white argosies of the sky, drifting slowly together to shape the thunder cloud. A few hours and they will be black and threatening; whirlwinds will split and tumble them, lightning and rain will leap from them. But now they sail in distant peace, placid and far.

The pilot measures them with his eye and reckons they are fifteen miles away and a mile or more in the air. The engine roars rhythmically, the plane scuds down the field and is in the air. Fields, roads and houses dwarf away, the hills flatten, the world is a shallow dish beneath us. The familiar earth drifts slowly below, speckled and patched with the affairs of men, but we carry our world with us and ride on the wings of the wind. The pilot signals that we are climbing—four, five, six thousand feet in the air—and the haze that was heat on the earth below veils the patterned landscape in a dim mist of blue.

We are nearing the cloud of our choice, a tumbled pile of white with edges tinted by the slanting sun. The haze lies below, its surface clearly defined and level; it stretches away like a limitless sea, blue and substantial. Clouds lie upon it all around the sky, towering high into the clearer air but flat below, as though they floated evenly on a quiet lake, like fanciful ships, like water-worn icebergs.

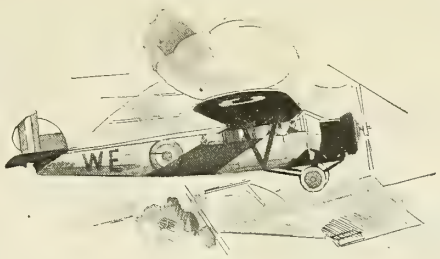
Now the cloud looms up before us, suddenly near and huge. Fifteen hundred feet it towers in the sky, its contours and edges sharply defined against the vivid blue of space; solid, substantial and immobile, as though mightily carved by playful gods. Its top billows out and overhangs like a giant tree, half-formed towers and turrets pile above it; deep clefts and caves scar its snowy sides. The sensation of breathless speed, lost in the loneliness of the open air, returns suddenly as we skim along the sheer white wall and swing into the valleys.

Now we mount above a spotless cloud hill loose piled with boulders of snow, and again across a tableland that seems to invite a landing. And now down a long ravine, between two towering walls that frown majestically down on the man-made fly that buzzes so impudently across the window of heaven, and come to a sudden hole in the cloud wall through which to break a way. And now we are in the heart of the cloud country, with the same cold and snowy stuff piled all around, in shapes and masses that mock the imagination.

A weird and fantastic country, newly made and soon to be shattered; fashioned of heat and wind and water, and destroyed again in the lightning's flash. Already it is stirred by slow currents and our wings rock at the breath of winds that blow from nowhere. Power is stored here at the borderline between earth and heaven, waiting release when the cool breath of evening shatters the blanket of heat that overlies the earth below. But this is no time to be thinking of what the lightning can do when in a mischievous mood.

It is all unreal and impossible, this Fairyland of the sky, but the illusion of solid stuff persists, even until the plane turns sharply and plunges headlong into the cloud cliff. It breaks and blows apart, and we are flying in a blind white fog which swirls away from the propeller and closes in again behind us; thin, feathery vapor, but blanketing vision close on every side. And suddenly we are out again and in another valley, with blue sky overhead and brief glimpses of the earth far below through breaks in the cloud floor. Over yonder winds the thin silver of a river; below

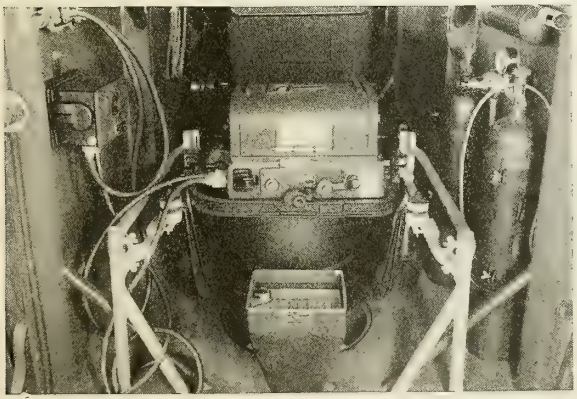
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This Fairchild 71 sold 8 others to the Photographic Section of the U. S. Army Air Corps



Fairchild 71, purchased by Photographic Section, U. S. Army Air Corps, in March, 1929, and used for over a year in all types of photographic work. Doors have been removed and special mounts for taking oblique serial photographs are in place on each side. Camera can be used out of either door opening, or through floor opening.



View within cabin showing Fairchild Fully Automatic Mapping Camera in place for vertical photographs. Note oxygen tanks on right for high altitude work.

After this Fairchild 71 had been in use by the Photographic Section of the U. S. Army Air Corps for slightly over a year in photographic work, the Corps ordered eight others for use in photographic training work. This order is especially gratifying to us, and significant to all users of planes for photographic purposes, since it necessarily was the result not of sales work, but of actual test of the ship by the Corps under its own conditions. The 71 "sold itself," giving still another proof of the preference of governments for it.

Photographic work has exacting requirements. The pilot must have ample visibility in every direction. The highest degree of lateral and longitudinal stability is essential, and so is the ability to maintain level flight at high altitudes. Correct aerodynamic design and balance, among other features, endow the Fairchild 71 with this unusual stability. Height of service ceiling, ability to get in and out of small fields such as are encountered on mapping expeditions, and ruggedness, are additional Fairchild features that make it particularly adaptable to photographic flying.

Every photographic activity, both vertical and oblique, was carried on by the Air Corps with its Fairchild 71, using every type of camera, both automatic and manually operated.

The same characteristics of the Fairchild 71 that make it so supremely suited for photographic work naturally also fit it for satisfactory performance in passenger and other transport activities. Its strength, for instance, means that it can be relied upon to take the air day after day and year after year, all year 'round. It can leave its base and repair facilities far behind. These qualities are especially valuable in work over undeveloped country.

FAIRCHILD AIRPLANE MANUFACTURING CORP.
FARMINGDALE, L. I., NEW YORK

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Farmingdale, N. Y. Hagerstown, Md.
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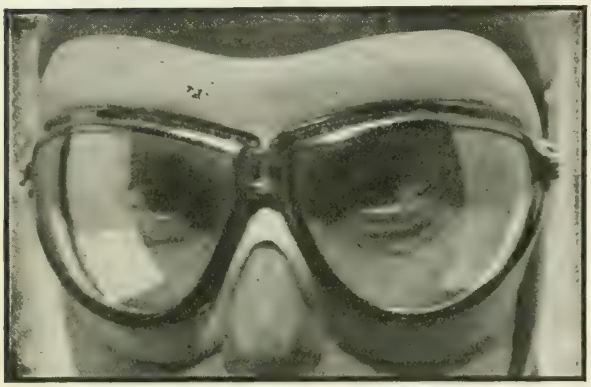
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Division of The Aviation Corporation

FAIRCHILD
AIRPLANES

Perfect comfort

and wide, clear vision

....SAFETY!



THE WILLSON PILOT GOGGLE

At the end of a prolonged flight, the Willson Pilot Goggle rests as comfortably on your face as when you started. Its sponge rubber vacuum mask is large in area, and light in pressure. It fits every contour of the face perfectly, and the venturi-tube ventilating system creates a partial vacuum to hold the goggle in place. The Willson Pilot Goggle can't blow off, even with wind pressure from the side. Nor can the lenses steam or fog, under flying conditions.

The lenses are meniscus-ground, to assure neutral vision through the entire field of normal eye rotation. Each lens permits horizontal vision of 135°. They are ground with the utmost optical precision, to give perfect unstrained vision, and greatest safety. The Willson Goggle is a Navy type.

The goggle frames are aluminum, enameled dull black like the inside of a camera. In every detail, the Willson Pilot Goggle is of advanced design, and precise durable construction. Yet it is priced no higher than many commercial goggles which are not a Navy type.....$20.

There is also the Willson Observer, at $10, exceptionally satisfactory in the service for which it is designed. If your dealer cannot supply you with these goggles, write direct to us.

Airports and flying schools find Willson Goggles a popular and successful line. Write for detailed information.

Willson Products, Inc.

Aviation Division

239 Washington Street

READING, PENNSYLVANIA

(*Continued from preceding page*)

is the close-packed pattern of city streets, bordered all around with the green carpet of fields. Folks are busy down there, coming and going on highways; turning, perhaps, to glance at a lonely speck playing boldly around the edges of a thunder-cloud.

And so back to earth in a long downward slide, the air pressing on the ears and making them sing. We climb out and look back along the sky.

And so we have seen Fairyland and the Palaces of the Air, an experience which all the wealth of the world could not buy before man found his wings. So it is with many of the marvels of the flying age, whether they are found in a giant airship "rolling down to Rio," a night mail ship following the lighthouses of the land from port to port, or a great transport above the trackless deserts of the West. Why don't we preach at all seasons the fascination of flying, a better bait to the customer than rapid transit will ever be? Flying is fast, flying is safe, flying is becoming daily more convenient and comfortable. But what the public needs to discover is that flying is fascinating fun, a new experience which never grows tiresome and a sensation which satisfies.

FLAT AND INVERTED SPINS

(*Continued from page 75*)

rect line with so little rotation as to suggest that it was caused by the initial rudder action. This ship is acting the reverse of the case quoted above and is getting near to the ideal behavior.

Investigating the opposite conditions to the first case and assuming that the C_N values above 27 degrees total greater than those below—we deliberately design an unfavorable progression of moments and a rearward center of gravity. The ship is placed into a spin and, because of the moments, goes flat almost immediately. Here, however, the inner wing is lifting, the outer sinking, and the ship rotates away from the spin. If the stall is continued, the ship first tends to rotate to one side then to the other and the rudder position has little, if any, effect. The whole appearance resembles extremely closely a "falling leaf." This is the same maneuver that was observed in the latest Alexander Bullet as noted above.

Figure 4 gives the actual C_N values of several different airfoils. However, the biplane arrangements are of the unstaggered, one-to-one gap chord ratio type only. Figure 7 gives the variations due to different wing arrangements, and Figure 8 the variations due to aspect ratio. Reverting to the conditions of Figure 6,—if in the spin the outer wing tip can be held at a value very close to 27 degrees, then the lift along the wing will favor the inner side, and the ideal condition will be reached. To do this, however, the X axis of the plane must be at a very high angle of attack; and to obtain this high angle, the progression of moments and the center of gravity must be favorable. This preordains a rearward center of gravity and a so-called adverse progression of moments. Then the flat spin can be eliminated (including all spinning) by the interaction of progression of moments and low sinking speed.

Every case, of course, will have to be investigated on its own merits. And especially in the case of biplanes and multiplanes, the variations of C_N with arrangement will have to be investigated. It will probably be found that there is a certain average for each arrangement coming fairly close to the values shown in the chart. It would seem, however, that a negative tendency of $dC_N/d\delta$ above 27 degrees is always dangerous.

The flat spin, then, is not caused by any one character-

(*Continued on next page*)



ROY T. MINOR

New York,
May 17th, 1930.

Menasco Motors, Inc.
6718 McKinley Avenue,
Los Angeles, Calif.

Mr. Menasco:

After flying the Pirate powered Great Lakes Trainer from Los Angeles to New York, covering an approximate distance of 2600 miles in less than 29 hours, I cannot say too much in praise for the engine.

The gasoline consumption was exceptionally low, using about nine gallons per hour. This however, was at an average R.P.M. of 1950, and on several occasions at wide open throttle.

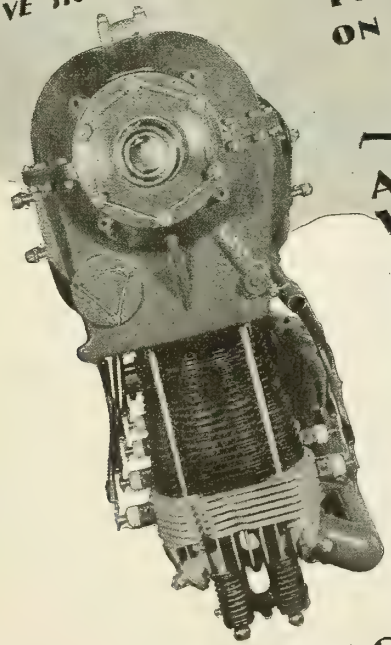
The point which I wish to stress upon mostly that was the very low oil consumption, using only 3 qts. for the entire trip. That item, combined with the exceptional dependability, has sold me on the inverted 4-in-line Pirate engine.

Sincerely,
Roy T. Minor

The MENASCO PIRATE AIRCRAFT ENGINE

APPROVED TYPE CERTIFICATE NO. 50
Dept. of Commerce rating
90 H. P. at 1925 R. P. M.
MENASCO MOTORS, Inc.
6718 McKinley Ave.
LOS ANGELES, CAL.

LOS ANGELES ◉ TWENTY FIVE HUNDRED AND EIGHTY FIVE MILES ◉ TO NEW YORK ON 3 QUARTS OF OIL



LESS THAN AN AUTOMOBILE WOULD REQUIRE

crankcase dilution in the average automobile would necessitate at least three oil changes

at the end of the trip the "Pirate" tank of two and one half gallons contained serviceable oil enough for a return trip to Los Angeles.

JUST ANOTHER ADVANTAGE OF THE INVERTED 4 IN LINE 90 H.P. MENASCO PIRATE

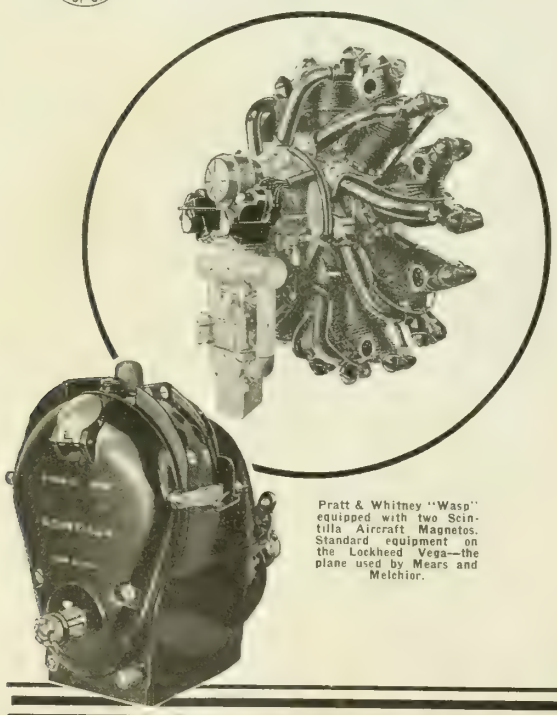
Round the world with SCINTILLA AIRCRAFT MAGNETOS

Mears and Melchior stake their lives and the success of their venture on the dependable performance of Scintilla Aircraft Magnetos which have been a factor in practically every outstanding achievement in aviation.

Made for engines of from one to eighteen cylinders.

SCINTILLA MAGNETO CO., INC.
SIDNEY, NEW YORK
(Contractors to the U. S. Army and Navy)
(Division of Bendix Aviation Corporation)

AERONAUTICAL CHAMBER OF COMMERCE



Pratt & Whitney "Wasp" equipped with two Scintilla Aircraft Magnetos. Standard equipment on the Lockheed Vega—the plane used by Mears and Melchior.

DEPENDABILITY
SIMPLICITY
ACCESSIBILITY

(*Continued from preceding page*)

istic, but a combination of several, in which the sinking speed or V_Y of the whole plane is the governing factor. Just where the border line lies, I am not prepared to state at present, other than to say that it is dependent upon V_Y,C_L/C_D, and aspect ratio, in the order named.

From this, I reach the following conclusions:

Adverse progression of moments tends to flatten a spin and, therefore, is an aid in resolving a normal into a flat spin.

Center of gravity has very little effect, except that a rearward center of gravity may make a ship change from a normal to a flat spin more easily.

High C_N values at angles of attack greater than 27 degrees help prevent spinning.

The flat spin is a direct result of higher C_L values and therefore of modern design.

The flat spin can be engineered out of an airplane with present knowledge.

For those interested in slots, flaps, etc., I am giving Figure 9 showing the variations of C_N values with different flap settings. In view of the rest of the article, the chart is self-explanatory. The use of slots, in my opinion, is to be frowned upon in the true non-spinning ship, for they tend to increase the lift of the outer wing tip without a corresponding increase of the inner. A much better idea is that of spoilers. Their arrangement and operation is easily to be seen from the rest of this article. However, I believe in straight design. The natural and mechanical weaknesses of most innovations of this sort are against them. The flat spin should be engineered out of the ship itself, and not dependent upon any extraneous attachments.

AN EXTRA SPECTATOR

(*Continued from page 73*)

then care a hoot about the airplane, nor for some years afterward. It thought the plane and the dirigible balloon were identical objects, at least that they were equally dangerous and useless. It largely ignored the Wrights themselves or buried them under fictional fancies. Nobody cared anything for the reminiscences of the five persons who were on the scene December 17 and still less for the story of the remote spyglass spectator. I suppose Westcott told his mates at the time that he too had seen the show, but neither he nor they regarded it as a matter of any importance. The life savers, or Coast Guards as they are known today, did not apparently think it worth while to mention such a trivial circumstance to their friends the Wrights.

Wescott's testimony was elicited by Mr. Booth as government counsel in the airplane patent suit of the heirs of John J. Montgomery, a California inventor, against the United States. This case dragged through the Court of Claims for a decade. It was decided in Uncle Sam's favor two years ago, thereby incidentally confirming a long series of domestic and foreign court decisions which award the invention of the airplane to Wilbur and Orville Wright.

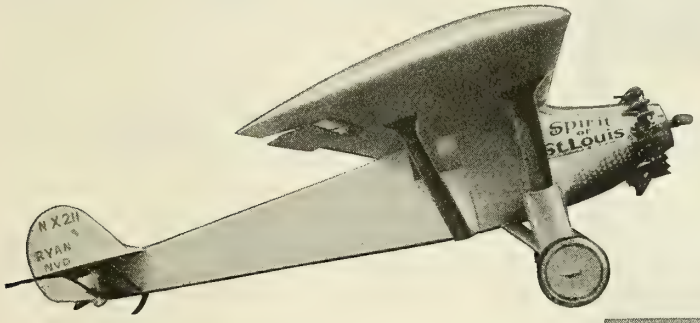
Wescott testified that he was actually on the scene on December 14 when Wilbur Wright made a near-flight, poking one wing in the sand. He helped that day to carry the machine up on the slope of Kill Devil hill and, after the abortive or slight test, to carry the somewhat damaged plane back to its shed hangar. Wescott's story of December 17 is in part as follows:

". . . . .the view was unobstructed. There was nothing between where I was and where they were. I could see it

(*Continued on next page*)

FAMOUS FLIGHTS WITH THOMPSON VALVES

in the "Spirit of St. Louis"



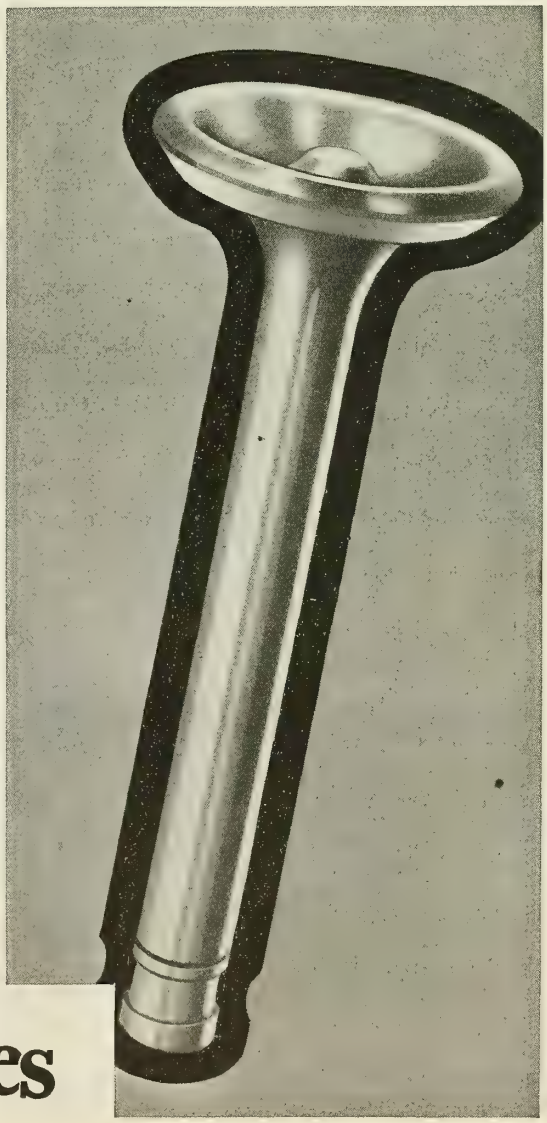
(This advertisement is one of a series recalling historic airplane flights in which Thompson Valves were used.)

IT is only three short years since a lone man left the coast of America and completed the first trans-Atlantic solo flight. The brilliant feat of this skillful, daring pilot has won unprecedented fame the world over.

In the world of aeronautics, the perfect performance of this pilot's plane, its engine and every engine part established an equally brilliant record of utter dependability.

Contributing largely to the success of this famous flight was the unfailing performance of the Thompson Valves that controlled the operation of the engine in the "Spirit of St. Louis."

And this is only one of the many outstanding achievements of Thompson Valves that have led to their specification in today's finest American airplane motors.



THOMPSON PRODUCTS, INCORPORATED
General Offices: Cleveland, Ohio, U. S. A.
Factories: CLEVELAND and DETROIT

Thompson Valves

NOW

"A pilot told his friends he was sorry he spent $380 for a parachute. The next day he had to pile out in a jog. He valued it at $250,000,000 then."

- - is the time to buy a parachute - - don't put it off . . .



Our seat type pack, as shown on the left, can have added to it in ten minutes a back pack for training and exhibition purposes, as illustrated below.



Note the universal grip for the back pack — it can't be missed. The harness is the most comfortable to ride down in that has ever been manufactured. The crossed seat straps and the rigid back on the seat pack account for +



An additional feature is the improved fasteners. Compare them with the snaps and D-rings which were formerly used. These new fasteners are forged of stainless steel, are easily connected and can be readily disconnected . . . even when a load is on the harness.

And, of course, The TRIANGLE PARACHUTE does NOT oscillate, is STEERABLE, has a LOW opening shock in spite of its extra FAST and CERTAIN opening, lowers you so slowly that you can land STANDING UP and is so STRONG that it has successfully descended 1500 lbs. of lead.

Ask about the complete details of this superior parachute and about the new HOFFMAN SAFETY BELT . . . either may save your life.

Easy payment plan available. Service for parachutes. Parachutes for rent.

The TRIANGLE PARACHUTE Co.

Box 37-Sta. N 4917 Carthage Ave. Globe-Wernicke Bldg.

CINCINNATI . . . . . OHIO

(*Continued from preceding page*)

plainly, and I was watching them with the glasses, spyglasses. I could tell one man from another plainly. They took the machine out and up on the track, on the level beach. Then Orville got in the machine and started it, and I should suppose he went about 100 feet, and the machine lit, and then it was brought back and put on the track again, and Wilbur took it and went something like the same distance —a little more, I think; and then they put it back on the track and Orville took it again, and he went about the same distance, something like it; and then it was put back on the track again, and Wilbur got in, and that time he stayed in the air something like a minute, I should think, and went about 800 or 900 feet."

The actual final record was 852 feet in fifty-nine seconds.

Wescott also knew how the virgin plane was operated: "....the elevator he worked with his hands. The rudder and the warping of the planes he did with his body. He moved the saddle that he lay in, moved it with his body, and that raised—the warping of the planes, one up and the other down. I was present when they were assembling the machine and putting this gear in place to warp the planes, and saw them practicing with it to get it right."

It seemed to Wescott that on Wilbur's last long flight the airplane at times had an altitude of twenty-five to thirty feet.

When the twenty-fifth anniversary of flight was celebrated at Kitty Hawk on December 17, 1928, with the surviving inventor, Orville Wright, and government officials taking part in the exercises, four of the five on-the-spot witnesses of 1903 were present. Brinkley, the quondam lumber buyer and casual spectator, was a seeming absentee. The trio of veteran life savers, Daniels, Dough and Etheridge, had places of honor on the platform among the distinguished guests. If the sixth witness was at the reunion on the crest of Kill Devil hill, where the cornerstone of a government memorial to cost a quarter million dollars was laid, his presence was apparently ignored. The design for this memorial, by the way, has been lately accepted by the War Department. It is a giant wing with a lighthouse beacon at the tip.

Robert L. Wescott, The Man With The Spyglass, The Sixth Witness of Aviation's Birth or The Bootleg Spectator at the Dawn of Flight, has his own niche in revised history.

We cannot include this honorable and enviable person in a category of superficially similar characters—the aerial stowaways, of whom one traversed the Atlantic in the English dirigible R-34 in 1919, another took surreptitious passage in the *Graf Zeppelin* between Europe and America, and a third perilously overburdened the airplane *Yellow Bird* in its trip across the Atlantic last year from Maine to Spain. Let the names of these impudent ones be forgotten while we extend welcome to the worthy Wescott.

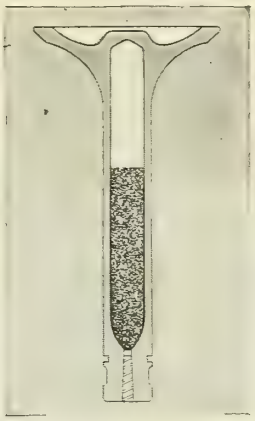
PRINCIPLES OF AERODYNAMICS

(*Continued from page 69*)

it better or makes it easier to understand. The airplane wing throws the air down; the propeller throws the air back. Not occasionally only, as at the beginning of a flight, but all the time during flight. The airplane is not placing itself on the back of a vortex or hanging itself under a vacuum at the beginning of the flight, like the rider on back of his horse.

That is the correct idea; try to impress it into your mind. If you succeed, you have learned half of all aerodynamics and perhaps more than that. Do not feel badly if I have

(*Continued on next page*)



4 important advantages of Rich Salt-Cooled Valves

Wilcox-Rich is the only manufacturer licensed to build salt-cooled valves. The salt-cooling process gives four important advantages to aircraft engines operating at high temperatures:

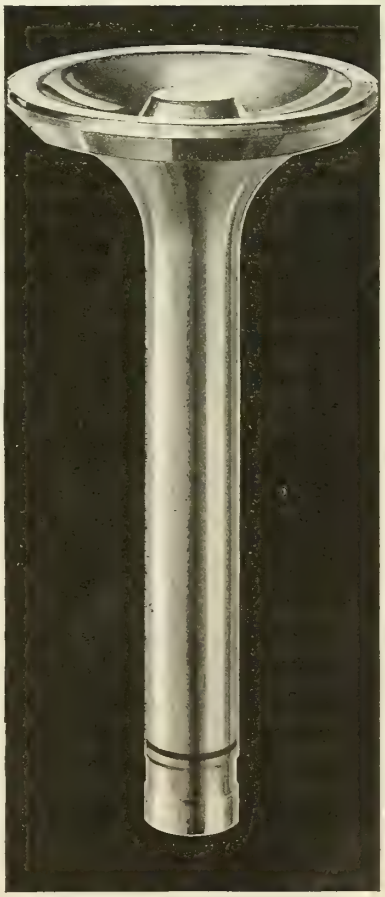
1 ***Lower operating temperatures. Salt-cooled valves run "black" under conditions where un-cooled valves operate at "red" heats.***

2 ***Lessened tendency toward detonation and pre-ignition, because of lower operating temperatures.***

3 ***Elimination of valve burning, distortion, pitting and wear, will greatly lengthen valve life.***

4 ***Improves the fuel consumption by lessening the tendency for detonation with lean mixtures.***

Owing to these important advantages salt-cooled valves offer an opportunity to improve the performance of aviation engines; generally without alterations to the existing design.



RICH VALVES

manufactured by

WILCOX-RICH CORPORATION, *Detroit*

World's Largest Manufacturer of Automotive Valves

Sold for Replacement Purposes Exclusively Through

McQUAY-NORRIS MFG. CO. - - ST. LOUIS *and*

KING QUALITY PRODUCTS CO. - - ST. LOUIS



Testimony
from Men you know

"The Stout Air Lines, accredited Pratt & Whitney service representatives, overhauled our Wasp Engine at 473 hours, 56 minutes and found the following conditions, i.e., a wear of less than one-half thousandth on the master rod bearing — no sludge and no excessive carbon deposit. The engine had never had a top overhaul and was functioning as well as when new; in fact we only picked up 20 r.p.m. by the major overhaul. I attribute this condition entirely to Deep Rock lubrication."

—"Dick" Allen.

Watch this space each month for expressions from men high in aviation regarding actual experience with Deep-Rock Aero Oil and Deep-Rock Fighting Grade Aviation Gasoline.

Deep-Rock Aero Oil is made in four grades, every drop Certified and every drum Sealed so that oil cannot be tampered with. New refining processes produce Deep-Rock Aero Oils from pure paraffine base crude. Strict adherence to specifications insures absolute uniformity. For complete data write "Dick" Allen, Aircraft Division...

DEEP ROCK OIL CORPORATION

General Sales Offices: 300 W. Adams St., Chicago
Refinery: Cushing, Oklahoma

(*Continued from preceding page*)

upset your ideas about the vacuum and the vortex. We will come to the vacuum soon enough; but concerning the vortex, let us forget about it, let us leave it to the professors of mathematics.

The usual conception of the vacuum is equally erroneous, and does not satisfy any soul. The wing lifts "because there is a vacuum on its top" sounds as absurd to me as saying "an automobile needs no horse because its wheels turn by themselves." True, if the wheels did not turn, the automobile would not move; but what makes the wheels turn? We eat not "because we put food into our mouths," but because we are hungry. The wing is carried by the air and a vacuum is formed on its top; actually there is not much of any vacuity, as we shall see, because the air reacts to being accelerated downwards, and kicks back. That is the thought that has brought forth the most useful and practical results.

We have now reached the point where it is wise (even if not so interesting) to lay down in symbols and scientific terms what we have come to understand from this discussion. Just as it is easier and more international to read the numbers "7,937" than the words "seven thousand nine hundred and thirty-seven," so mathematical equations are also easier to read than complicated sentences. They are also more international, for they are freed of the words of any particular language, and are therefore a shortcut between thinking and writing. Of course, we must understand the symbols; otherwise, they can mean no more to us than Chinese characters.

In aerodynamic equations there occur just a few Greek letters, and it is not hard to read them. Some Greek letters are quite similar to their Latin brothers; *alpha* for instance. *Alpha* was originally a Phoenician word, meaning ox; this root is still found in the word *elephant,* the big jungle ox. The picture of that ox was simplified to a capital *A,* both in Greek and later in Latin, and used to signify the vowel with which *alpha* begins. The lower case *alpha* is α, similar to *a* but written in one loop, beginning on top, and following certain portions of *A*. In aerodynamics this *alpha* invariably indicates the magnitude of some angle.

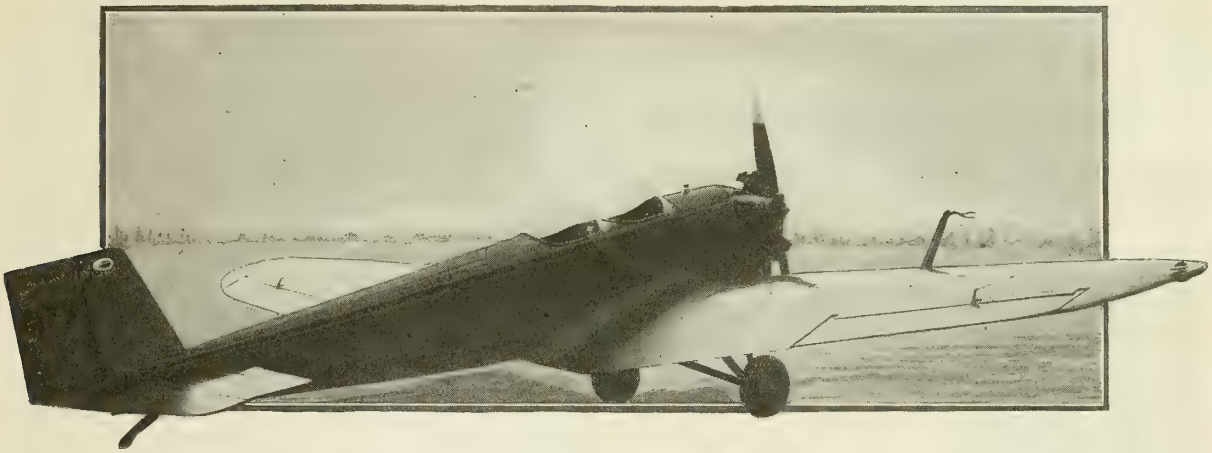
Another Greek letter which we have to use now, is *rho*. The capital *rho* looks like the Latin capital *P,* and the lower case *rho* looks like this, ϱ; write it starting on top, imitatnig a *P*.

The Greek *P* consonant looks different from the Latin *P;* it looks like a portal, two columns and a horizontal top π, and it is called *pi*. The small *pi* always signifies the ratio of the perimeter of a circle to its diameter ($\pi = 3.14$). The density of the air is always represented by ϱ. That density is different on different days and at different altitudes. In most cases we use the air density at sea level; in other cases, an average value of it. Such average is a matter of opinion, but in order to promote uniformity, "standard" average density has been specified throughout the country, a different one for each altitude.

The standard density ϱ of the air at sea level is 1/421 in our national units. The unit for density is $lbs.\ sec.^2/ft.^4$ which looks decidedly discouraging to those uninitiated in the theory of physical dimensions. Do not be discouraged about that expression; dismiss it for the time being. Forget also about the numerical value of ϱ. We are going to use a numerical constant containing one more factor and therefore different from 1/421.

Suppose now a stream of air with the cross-section *S* square feet has an average velocity *V* feet per second. The volume passing by is then *S V* cubic feet per second. The

(*Continued on next page*)



THE AEROMARINE KLEMM OUTCLASSES ALL OTHERS

THERE'S speed written in the straight, flowing lines of the new Aeromarine Klemm. There's "stand-up-and-take-it" ruggedness under its sleek, glistening surface. And there's a constant reserve of smooth, certain power harnessed in the nose of this favorite sport and training plane.

To the flying school operator—the long distance commuter—sportsman—owner—to every flier, the Aeromarine Klemm brings a new, reliable and economical performance. Born as a glider and inherently stable, it flies itself. Responsive, safe, powerful, comfortable . . . the Aeromarine Klemm outranks anything in its class—in both flying performance and price.

More outstanding than beauty, stamina, speed or power, though, is the unheard of economy of Aeromarine Klemm's operation. Hourly flying costs much lower than those of the average training or sport plane mark this most modern of all light airplanes as the predominant buy for those who are mindful of flying expenses.

Here, for instance, is a typical example of Aeromarine Klemm's day-in-and-day-out economy. Plane number 9177, used as a training plane by the Airview Flying Service at Red Bank, New Jersey, cost $3.20 per flying hour, based on all expenditures from August 25th, 1929, to March 29th, 1930. Hourly cost was computed as follows: 987 gallons of gasoline at 30c., $296.10; 18 gallons of oil at $1.60, $28.80; service, repairs and cleaning at $1.50 per hour, $334.50; replacement parts, $52.84. Total, $712.25 . . . divided by 222 flying hours, equals $3.20 per hour. That's *real* economy for you.

A group of nine students soloed in this same plane in an average of 4½ hours each!

For primary training the AKL-25, powered by the Salmson 40 h.p. engine, sells for $3350, flyaway, Keyport, N. J. For secondary training and for cross-country work, the AKL-60, powered by the LeBlond 70 h.p. engine, sells for $3500, flyaway, Keyport, N. J. Equipped with pontoons and powered by the LeBlond engine, the AKL-60 sells for $4500, flyaway, Keyport, N. J.

Dealers and distributors are invited to investigate our profitable franchise and territorial assignments. Write for complete data and information on our sales plan.



AEROMARINE KLEMM CORPORATION

GENERAL MOTORS BUILDING 1775 BROADWAY NEW YORK CITY

Revolutionizing The Performance of Aircraft Engines



THE stringent requirements of safety and dependability which aviation imposes on spark plugs have been fulfilled to a new and revolutionary degree by Champion's Aero A.

Built to give *better* and *safer performance* in the varied conditions to which an aviation spark plug is subject, fouling and preignition of the Aero A are practically impossible.

Sillimanite, the finest known insulator, is particularly adapted to aircraft spark plugs because of its remarkable strength. Moreover, the unique design used in the Aero A *positively prevents interference with engine operation*, in the remote possibility of breakage.

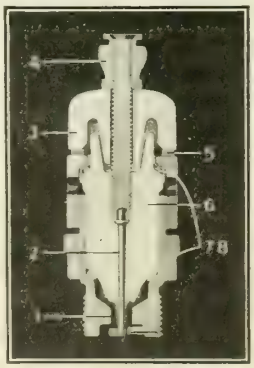
Aero A's are winning for themselves the same reputation for better performance and greater dependability in the air, that other Champions have enjoyed for years, the world over, on land and water.

Install Aero A spark plugs in your plane. The improvement they will bring you is unmistakable. They will render you *more* hours of dependable service.

Champion Aero A
Exclusive Features

1. Restricted bore. 2. Special analysis electrode. 3. Secondary sillimanite dome insulator. 4. Welded steel terminal. 5. Copper seal. 6. Primary sillimanite insulator. 7-8. Molded copper gasket seals.

Concentration on this one type spark plug for practically all aircraft engines enables Champion, through large production, to offer this vastly superior spark plug at the extremely low price of $1.25.



CHAMPION
SPARK PLUGS
TOLEDO, OHIO WINDSOR, ONTARIO

(*Continued from preceding page*)

dimension *cu. ft./sec.* results automatically by multiplying the dimensions of S and V by each other. The mass of the air passing by per second is therefore $S \cdot V \cdot \varrho$ *ft.*^{3}*/sec. lbs. sec.*^{2}*/ft.*^{4} $= S \cdot V \cdot \varrho$ *lbs. sec./ft.* Suppose now this airstream, flowing substantially horizontally (but not exactly so), has no initial vertical component of motion, but is slightly bent by acquiring a vertical downward component of u *ft./sec.* We will compute the lift or upward air force associated with this motion. This force, L, is equal to the product of the mass per second multiplied by the change of velocity:

$$L = S \cdot V \cdot \varrho \cdot u \frac{\frac{lbs.\ sec.}{ft.}}{\frac{ft.}{sec.}} = L \cdot S \cdot V \cdot \varrho \cdot u \text{ lbs.}$$

The dimension, plain pounds, comes out right by itself and that is why the density has to have such queer dimension.

By way of example, let us suppose the cross section of the airstream is circular, with a diameter of 30 feet. The velocity may be 150 *ft./sec.* and the downward velocity component of deflection u may be 20 *ft./sec.* This gives the lift

$$L = \frac{150 \times 20 \times 30^2\pi/4}{421} \text{ lbs.} = 5060 \text{ pounds}$$

which is quite a noticeable lift.

So you see what a simple matter it is to compute lift.

After this discussion of the physical principle of aerodynamics and after the explanation in the next article of a few technical terms that are easy to explain and occur often in print, we shall soon feel thoroughly at home in aerodynamics, and will then discuss the different relations directly used in airplane design.

This is the first of a series of articles on Aerodynamics by Dr. Munk. To be continued in the August issue.
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GYROPILOT GOES CROSS-COUNTRY

(*Continued from page* 52)

on each leg of the trip. It was acting better each time, the new contacts were about right, but unless it was certain to act perfectly, it was considered hardly a wise thing to throw in the clutches while the plane it was flying was in formation where pilots must always do the right thing at the right time.

The few times it did "go haywire" a contact on one side of one of the three series would malfunction, and away the bomber would go, a wing drop, or the nose fall or lift, or swing right or left. Mr. Sperry would make a dive for the box back of his seat and throw out the proper clutch, Lieut. Beaton would bring things back to normalcy, and I would pick up the maps I had scattered in the nose of the Condor where I held sway.

On May 4th, the 2nd Bombardment Group returned to its home station at Langley Field. The Gyropilot was removed. That the idea of a mechanical pilot and that particular design of mechanical pilot was feasible there had previously been no doubt. Yet this trip to the West Coast and return was the real service test of a device that has improved slowly but surely for eighteen years, that has gone from airplane to laboratory and back to airplane until it is steadier and surer than most eighteen-year-old pilots and far huskier than any fifty-pound pilot known to the aerial world.

ANNOUNCING



THE WHITTELSEY "AMPHIB"

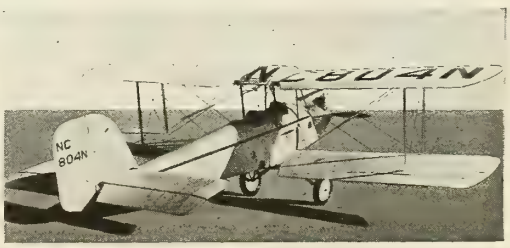
THE Whittelsey Manufacturing Co., American manufacturers of the world-famous *Avian,* have just acquired all the capital stock and assets of the Taft Airplane Corporation, builders of the Kingfisher Flying Boat.

With the addition of amphibion gear and a few refinements, this new plane will be produced at the Whittelsey plant with the skill and precision characteristic of the Whittelsey organization and will be sold under the trade name Whittelsey *Amphib.*

The Whittelsey *Amphib,* powered with a 165 h.p. motor, is a 3-place, open cockpit, pusher type amphibion of sturdy wooden hull construction. It will be available also as a 4-place flying boat. A series of tests and more than 100 flying hours have demonstrated its aero- and hydrodynamic soundness. The Whittelsey *Amphib* will fly hands-off on either full throttle or in a throttled glide. It is remarkably stable in the air as well as on the water and defies spinning at the hands of even the most experienced test pilots.

With the roomy, draft-proof cockpits situated well forward and the propeller located in the rear, pilot and passengers are comfortably shielded from spray, slipstream and spattering oil.

Those who cannot resist the call of open water, receding landscape and "the third dimension" will find in the Whittelsey *Amphib* the result of the master boatmaker's and aircraft designer's professions—an answer to the challenge to sporting blood.



THE WHITTELSEY AVIAN

And for the student, overland commuter and those who prefer to sport above the ground there's the Whittelsey *Avian.* Popular as a training plane and famous for its record flights all over the world, the *Avian* offers downright safe performance that no other light plane can equal. And economy that can't be beaten—every gallon of gas gives 20 miles of sure, swift travel. You can buy an *Avian* now for about $1358.00 down and the balance in monthly payments.

DEALERS

Here are two planes that meet every demand of training, sport and business flying—over land and water. Responsible dealers and distributors are invited to investigate the Whittelsey franchise covering these two planes. Write for our sales plan and for full data and specifications of the planes themselves. The Whittelsey Manufacturing Company, 220 Howard Avenue, Bridgeport, Conn.

WHITTELSEY  **AVIAN & AMPHIB** 

The "Stradivarius" of Pliers



Order a pair today (we etch your name on handle FREE) and see for yourself how long they last! Vacuum Grip No. 137. Length 7". Price $2.00. Sent postpaid if your dealer can't supply you.



EVERY violin turned out by Stradivari, the greatest violin maker of all time, was a masterpiece. Had he made pliers instead of violins he would have fashioned them exactly like this fine example of Vacuum Grip craftsmanship. The same faultless design and balance. The same precision in fitting and adjusting.

This particular Vacuum Grip pattern is a great favorite with airplane mechanics because of its all-around usefulness. Unbeatable for gripping power. Equally efficient for cutting. Valuable in a hundred ways. Almost 150,000 in daily use!

Made of the toughest steel ever put into a pair of pliers—electric furnace alloy tool steel hardened *through and through, not case hardened.*

Write for catalog of over 50 patterns and sizes.

FORGED STEEL PRODUCTS CO., Newport, Pa.

Vacuum Grip

REG. U.S. PAT OFF

Pliers

Built *UP* to a Standard—Not *DOWN* to a Price

OVER 6 0 0, 0 0 0 IN USE

AIR CORPS TECHNICAL SCHOOL

(*Continued from page* 67)

A complete schedule of operations, lectures and examination for a specified part of the work is used by the instructors. This schedule shows a list of subjects covered and the time allowed for the completion of each subject. Instruction is arranged in blocks or in an instructional order. All operations are arranged in a progressive order commencing with the most elementary and gradually progressing into the more advanced subjects as the student extends his knowledge and skill.

The divisions through which the student in maintenance engineering and airplane mechanics passes are as follows: woodworking, wire and metal, dope and fabric, propellers, instruments, wings and fuselages, rigging, engine repair, carburetion, ignition, installation and test blocks. Each subject is complete within itself and is throughly covered. Nine months are required to complete this course.

The general machinist course consists of actual operations on hand-filing and bench work, drill presses, milling machines, shapers, lathes and grinders. This work teaches the student how to complete any machine job that is necessary to be done on an airplane. Six months are required to complete this course.

The aircraft welders' course consists of three months of intensive instruction on the welding of all kinds of metals, particularly tubing and sheet metal, the make up and welding of all types of joints and compression members, and the repair and overhaul of radiators and other sheet metal used on airplanes.

Those who are selected for the parachute rigging course are men who are known to be steady, reliable and especially careful in their work. These men are usually graduates of the airplane mechanics' course. The parachute rigger is taught the principles of the parachute, its folding, maintenance and repair. The rigger's final examination is to make a voluntary jump with a parachute he has folded.

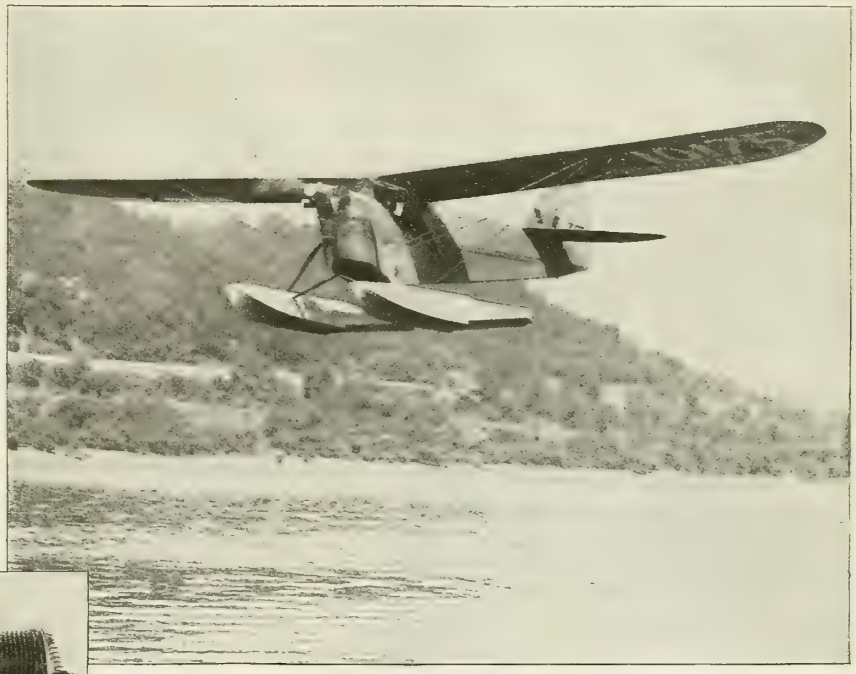
The aerial photography course covers a wide range of subjects including cameras, elementary optics, photographic chemistry, arithmetic, elementary photography, negative making, printing, enlarging, sterograms, ground photography, copying, filters and mosaic map making.

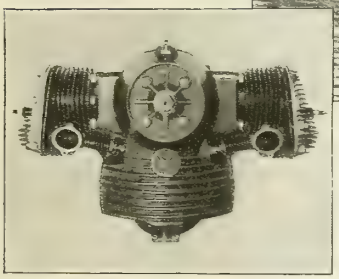
The communications course consists of instruction on the following subjects: code practice, typewriting, general radio theory, batteries, motors, generators, vacuum tubes, radio procedure (both tactical and traffic), applied theory to Air Corps communication sets, troubles and their remedies, field telephones, airplane radio sets, post radio station equipment, Air Corps radio sets, and airplane and ground installation of radio sets. The student is required to be able to receive and send thirty words per minute. This course is very complete, and its standards are very high, its educational requirements being at least a high school certificate or its equivalent.

The instruction carried on by the armament division is as follows: essentials of mechanics, aircraft machine guns, automatic pistols, rifles, shot guns, aircraft machine gun sights, explosives and pyrotechnics, aircraft bombs and bomb racks, bomb sights and camera obscura, aircraft machine gun synchronizers and armament maintenance.

A certificate of mechanical training is granted upon the satisfactory completion of a prescribed course. After the completion of a course of instruction, the student is assigned to an Air Corps unit where he has the opportunity to put into practice what he has learned in the school.

Here's the Answer to Thousands of Requests





Aeronca E-107 A—30 H. P. at 2500 R.P.M.—the motor as famous as the plane. Unique design and unusually fine materials account for its faultless performance and extreme economy of operation



Air Wheels, made by Goodyear are preferred by many and can be installed with a few extra fittings

Since the Aeronca C-2 has been approved by the Department of Commerce it has literally flown its way into nation-wide popularity. Its phenomenal performance, uncanny safety, and unprecedented economy have created a demand which necessitates a production schedule surpassing that of any other plane today. And this demand is coming from the great army of individuals who have waited patiently for such a plane as the Aeronca—a plane which they can fly safely, buy easily and own proudly.

To completely satisfy the many thousands of requests for pontoon equipment . . . we have engineered it . . . without changing that typical Aeronca performance in any way. For those who wanted airwheels, we now supply them . . . at a little extra cost. And we are far enough advanced now to tell you the whole story of the ingenious motor which has made the Aeronca such an amazing plane—in performance, in cost and in maintenance. Write for the details today!



THE AERONAUTICAL CORPORATION OF AMERICA

LUNKEN AIRPORT CINCINNATI, OHIO

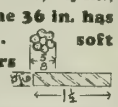
PORTER

PORTABLE
HAND OPERATED
CUTTING
TOOLS

The Shear Cutter

This is the most recent adaptation of the Porter lever and toggle joint principle and is the first Porter tool having jaws operating on the shear principle with the cutting edges passing each other in the cutting operation.

It is made in three sizes, 14 in., 24 in. and 36 in. The 36 in. has a capacity of 5-8 in. soft wire rope or flat bars 1 1-2 in. x 9-32 in.



In cutting wire rope the Shear Cutter severs every strand and leaves no uncut or ragged edges. On flat stock the cut is clean and the edge of material is not unduly twisted or distorted. The Shear Cutter is rapidly gaining recognition as a valuable time saver in many industries as well as an emergency tool for airports. It has the cutting capacity of a bench or power tool plus portability. It is used extensively in wire rope plants and has been found to meet a long felt want in elevator and hoist installation work where wire cable is used. Telephone and power companies are using this tool with great satisfaction on guy wire and it promises to be one of the most popular models ever brought out by this company.

The Porter line of portable cutting tools includes Bolt Clippers, Chain Cutters, Nut Splitters, Shear Cutters, Wire Cutters, etc. in a number of sizes and models. Write for folder illustrating and describing the Porter line.

Sold by leading jobbers.







H.K. PORTER INC.
12 Ashland Street
EVERETT MASS.

HITCH-HIKING ON THE CLOUDS

(*Continued from page* 68)

"It seems that my soarer, *Vienna,* is going to get a day of rest. No wind at all on the Rhoen mountain this hot summer day. Yet suddenly a wind gust. Dark clouds at the horizon promising a thunderstorm. Let's go. I give the usual commands and the shock cord snaps us up in the air. I do not have any time to stay on the slope; my ship is going up faster than ever before. Rain pours down on fuselage and wings. A flash of lightning through the dark clouds, there is thunder on all sides. I am still rising. The altimeter climbs without stopping. Will I be able to keep ahead of the storm; I am already 4,500 feet above the starting point. The stormy clouds crowd together around me. They are getting denser and denser. A game is starting. I am trying hard to keep straight ahead, but it seems impossible. What is the matter with my compass? Has it gone crazy? It runs around in a circle. My speedometer starts trembling, jumps up to fifty, sixty and seventy miles an hour. By pulling the machine I try to lower the speed. I feel as though I am standing with my feet against the sky. I am getting pushed down by some irresistible pressure against the seat. Thinking of my parachute gives me courage again. Suddenly it becomes very quiet. I balance the plane and try to bring it back to normal speed. It is getting lighter. I already can see fields and gardens below. My rainsoaked hair, as well as my shirt, starts drying. Some cool outfit for 6,000 feet of altitude. The country below looks familiar. A town is in sight. Gotha. I keep on going. Time passes by and it starts darkening, but my glide is close to its end. I am seeking a wide empty field. A few minutes and my ship slips safely into the grass."

Isn't this sport one of the finest and cleanest, combining education, art, skill and science? Even the older people who were standing aside skeptically now learn to believe in aviation, seeing how the air is mastered without a motor. Let's give the soaring sport every encouragement.

Translated from the original German by Martin Schempp and Jack Herrick.

AVIATION NEEDS SALESMANSHIP

(*Continued from page* 76)

"That's just it. I'm afraid he'd have trouble convincing you that he could show a profit."

The automobile manufacturer could hardly believe his ears. He removed the cigar from his mouth and stared at his son in amazement. Was this the man whom he had so long considered a chip off the old block?

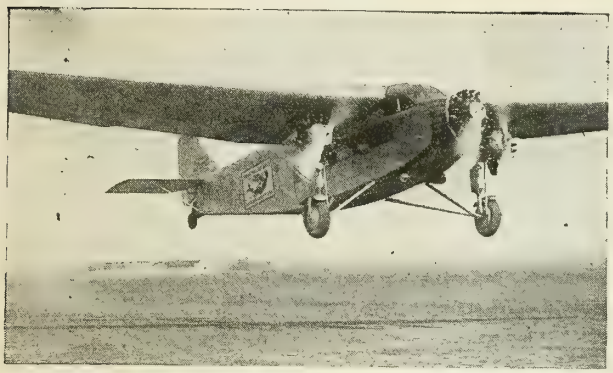
"Blair Whitlock, look at me. Have I got to re-sell you on the possibilities of your own industry? Have I got to convince you all over again of the marvelous potentialities of aircraft? Why, man, don't you realize that flying hasn't even scratched the surface yet? True, your scheduled planes are now doing about 83,000 miles a day; but that isn't a drop in the bucket to what they'll be doing tomorrow. If you birds will quit belly-aching and get to work selling, before you know it every town of 10,000 or more in the United States will be the hub of a whole wheel of radiating airlines. Don't you realize yet that every city is located on an ocean of air that offers it wide-open highways to all the markets of the world? Don't you realize that every acre of cultivated land is literally begging for aircraft to deliver it from slavery to insect pests? Don't you realize that every county in every State wants to be photographed and surveyed from the air?

"Man, don't you know that 10,000,000 men and women

(*Continued on next page*)

WHAT *the World Thinks* of this National System of Government Approved Aviation Schools

Let the opinions of those who know through actual experience be a guide to you in selecting an Aviation School. You cannot, then, go far wrong. Read these letters taken at random from our files:



A transport student pilot taking off in a trimotor plane, training in this type of aircraft being a part of the Universal Transport Pilots Course.

"I thought you might be interested in knowing after completing a course in aircraft welding under your instruction that I have built a Heath light plane fuselage and did a neat piece of work on it, too. Of course, a knowledge of blueprints is very helpful to me also, but without Universal's welding course I could have never done this job. I made back part of what the course cost me." —*E. Ten Eyck.*

'Mr. Roscoe Prescott, procured through you about two months ago, has proven very satisfactory as our Chief Instructor. Today we have had the pleasure of receiving Mr. H. D. Philbrick as Chief Welding Instructor, who by all appearances will prove satisfactory. We want to thank you for this service." —*Andrew L. Schaidler, Pres. The Aero Corp. of America.*

"This will come as a surprise to you, and I hope a pleasant one. You will see by the letterhead (Airlines) that I have succeeded, thanks again to the Universal School at St. Louis and its officials. I passed my examination for Transport Pilot the 1st and am exceedingly happy. My mother bought me a ship, and I am doing very well here. The first two months have passed and in figuring up my average earnings I find that it averages $1500 the first two months and expect to do better." —*Harold S. Platt.*

"The training received in the business class combined with my previous sales experience fitted me for this position to the satisfaction of the .....Aircraft Corporation. I again want to thank you for your personal interest and wish you continued success." —*V. M. Huff.*

"The Universal Extension Course is beyond doubt the most complete course in the world. It has the best authentic information and instruction, this being obtained by Universal's practical everyday experience in aviation transportation. Your course is as good as two years of college education because it is easily understood, clearly illustrated, and you seem to have a personal acquaintance with each instructor who writes his part of the course. There is only one thing I regret about and this is that I did not take the course sooner. If there should be anybody who is in doubt as to whether the course is worth the time and money I wish you would refer them to me. There is no doubt but what it is the foundation for my success in aviation." —*Robert Deverell.*

"Eighteen months ago I started my training at the Universal Flying School in St. Louis. After completing a Limited Commercial Course I secured a position as a pilot where I quickly got in enough flying time to take my government transport examination. Thanks to the thorough ground school training and excellent flying instructions I had received at the Universal school, I had no difficulty in passing all government tests. Since that time, my progress has been rapid, each step forward being accompanied by advancement in pay. While I now get in as much flying time as I wish, my work is largely directing the flying of others." —*Ray Kutterer.*

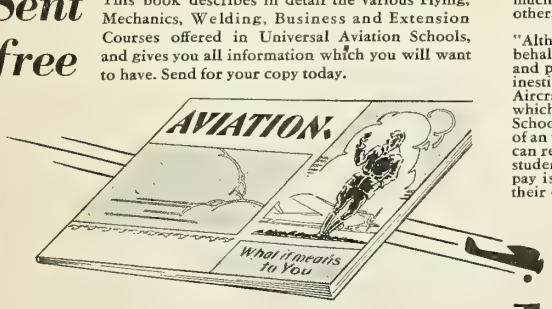
"Although I have expressed my appreciation of your efforts upon my behalf verbally, may I reiterate it in writing. The aid you so efficiently and pleasantly gave in my search for a position in the industry was of inestimable worth and resulted in my affiliation with the..... Aircraft Corporation. It is my sincere belief that the employment aid which you render is an invaluable asset to the Universal Aviation Schools. The students who avail themselves of your help are assured of an understanding co-operation and the employers whom you contact can rely upon your estimate of those you may recommend. Prospective students of the schools may well feel that a portion of the tuition they pay is justified by the placement aid they receive after completion of their course." —*Stife W. Jens.*

Many pages of this magazine could be filled with such letters from Universal graduates and from executives in the aviation industry who have employed Universal graduates. Seldom will you see in *any* kind of a school so enthusiastic a student body or such a loyal spirit among its graduates.

You will be interested in reading "Aviation—What it Means to You"—a book about Universal Aviation Schools which we gladly send you free.

Sent free

This book describes in detail the various Flying, Mechanics, Welding, Business and Extension Courses offered in Universal Aviation Schools, and gives you all information which you will want to have. Send for your copy today.



08

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A DIVISION OF AMERICAN AIRWAYS, INC.

Operating Company of The Aviation Corporation

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Please send me, without obligation, a copy of "Aviation—What It Means to You," and advise me what training I need to become

☐Pilot ☐Mechanic ☐Welder ☐Office Executive

Name.....*Age*.....

Address.....*Phone No.*.....

City.....*State or province*.....

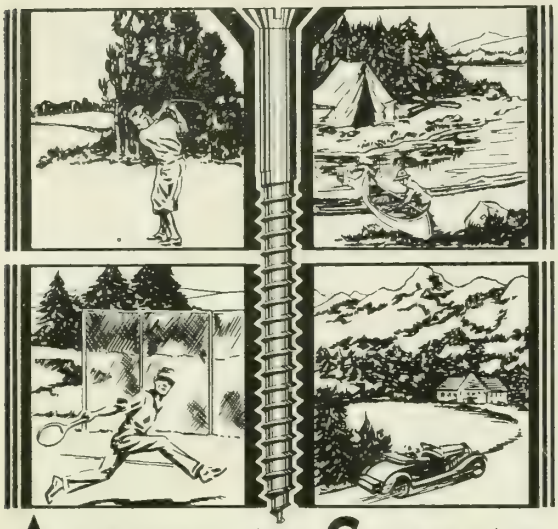
My past experience other than aviation is

.....

.....

PLEASE PRINT CLEARLY

UNIVERSAL AVIATION SCHOOLS



AMERICAN SCREWS
DON'T
Take A Vacation!

ABOUT this time most of us are beginning to swelter in the summer heat and are thinking about taking a vacation.

It is a good thing American Screws are not human; they haven't had a "vacation" since the company began operating in 1838. They do their job of holding wooden construction together in the tropics and in freezing climates all the year round.

You'll save yourself time and patience by using American Screws. Their sharp gimlet points and true running threads will make your work easier, quicker and more solid.

You can do any job better with American Screws

MADE IN THE UNITED STATES OF AMERICA

WOOD SCREWS | TIRE BOLTS | STOVE BOLTS | MACHINE SCREWS

AMERICAN SCREW CO.
PROVIDENCE, R.I., U.S.A.
WESTERN DEPOT, 225 WEST RANDOLPH ST. CHICAGO, ILL.
"Put It Together With Screws"

(*Continued from preceding page*)

want to learn how to fly? Don't you know that every town that has a postoffice is sadly in need of airplane service, not only for mail delivery, but for express and passenger transport as well?

"And just think of your foreign market! I know what you're up against in Europe, of course, because of the subsidies over there. But, there are scores of other nations that manufacture little if any aircraft—literally scores of countries that can be persuaded to buy whole fleets of airplanes. Entirely aside from their military requirements, you can sell them airplanes for coast guard service, such as life saving, location of vessels in distress, and prevention of smuggling; for forestry service, such as surveying, fire patrol, and reforestation; for crop surveying; for mail service; for map-making; and for a whole flock of other needed services.

"Why, man alive, the airplane has more uses than a woman's hairpin. If I were ten years younger, you couldn't possibly keep me from selling out my automobile business—and putting every dollar I possess into the aircraft industry. Maybe I'll do it, anyhow. For aviation is big, Son—bigger than any of you fellows realize. And I'm willing to bet you a brand-new trimotor against a second-hand Jenny that it will grow at least fifty per cent a year for the next ten years—probably a whole lot faster even than that. Aviation may be in a flat spin now; but it's bound to come out all right. And before many more years it will climb up and up and up to the place in the sun which it deserves.

"A good pilot doesn't lose his head and bail out just because he happens to go into a stall or tail spin. He keeps his head and regains control of his ship. What do you care for the loss of a few hundred feet of altitude? You can always recover and climb back up.

"You fellows in the industry are sitting on top of the world. All that aviation needs is salesmanship."

THE METALCLAD AIRSHIP

(*Continued from page* 55)

Metalclad, which will have a speed of 100 miles per hour, with the fifty-seven-ton flying boat above referred to.

The estimated capital investment required for the building of two 100-ton airships, including terminal facilities, spare parts, working capital, etc., would be $14,000,000 Each airship would make one round trip per week. With a payload of 16,000 pounds each, these two ships could transport 1,632 tons or 3,264,000 pounds of pay cargo per annum. In order to equal this commercial performance, seventeen flying boats of the type mentioned would be required. The estimated capital investment for the purpose of these seventeen boats, including terminal facilities spare parts, working capital, etc., would be $13,000,000.

The flying boat is equipped with engines developing 6,000 horsepower, and its cruising speed is announced to be 115 miles per hour. Its useful load minus crew, according to its designer, is 56,815 pounds. Assuming that the entire useful load capacity would be available for fuel and pay cargo, let us endeavor to ascertain how much payload the plane would be able to transport on a route from California to Hawaii, a distance of 2,540 miles.

At a speed of 115 miles per hour, it would require twenty-two hours for this boat to negotiate the voyage in still air. Fuel amounting to 2,100 pounds would be required per hour at cruising speed. Twenty-two hours' flying would require 46,200 pounds. Allowing for a twenty-mile head wind, which is the minimum allowance that would be safe to consider, additional fuel of 9,615

(*Continued on next page*)

Come On Down South to

Dallas Aviation School

Where Student Pilots Train Better— Graduate Sooner—Pay Less

The oldest and largest aviation school in the entire South is a school for those who must make the most of their time and money. EVERY CENT goes into maintaining the best equipment and most able instructors available—no needless overhead. Seven years' experience has shown us how. Ideal every-day flying weather increases your saving. COMPARE these rates:

Transport Course — $2500

The full course of 200 air hours with complete ground school. Qualifies for Transport License.

Commercial Course—$795

Fifty hours of training in the air, with full ground school course in classrooms and shops.

Private Pilot's Course $385

Twenty air hours and the complete ground course.

WE WILL PAY YOUR RAILROAD FARE TO DALLAS

from your home, whether you come by train or auto, if you enroll for the Transport or Commercial Course—one-half your fare if you take the Private Pilot's Course.

Our free catalog tells all about our school and ALL its courses. Yours for the asking.



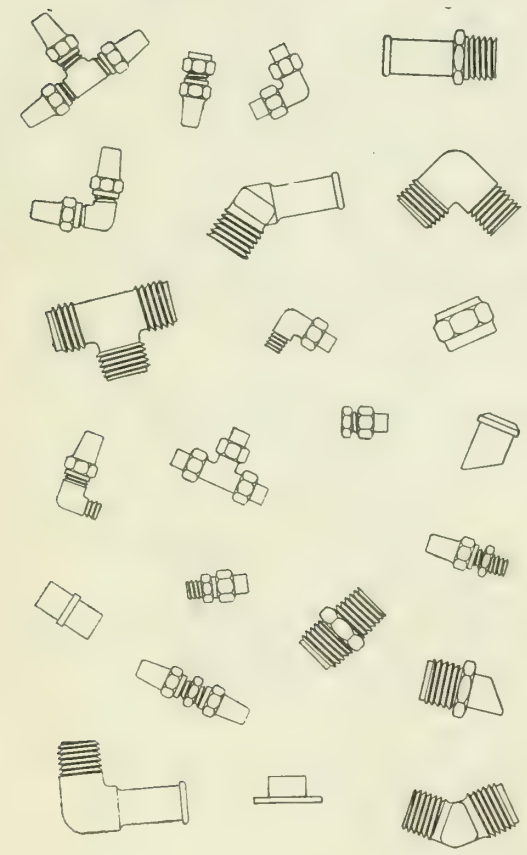
D A L L A S

AVIATION SCHOOL

LOVE FIELD :: DALLAS, TEXAS

LUNKENHEIMER
AIRCRAFT SPECIALTIES

TUBING FITTINGS



THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U.S.A.
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PITTSBURGH SAN FRANCISCO LONDON
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

THE LUNKENHEIMER CO. "QUALITY" P. O. Box 876, Cincinnati, Ohio

Gentlemen: 34-10-2

Send me a copy of Lunkenheimer Aircraft Specialties Catalog No. 3.

Name_____
Firm_____
Position_____
Street_____
City_____ State_____

(*Continued from preceding page*)

pounds would be required. The total fuel required would then be 55,815 pounds. Subtracting this figure from a useful load of 56,815 pounds would leave only 1,000 pounds carrying capacity for payload.

Assuming that each boat would make a round trip in three days, this would allow approximately twenty-four hours at the end of each voyage for adjustment and repairs. Thus it would require seventeen of these boats to transport the same weight of pay cargo per annum that two 100-ton rigid airships, previously described, could transport.

The amount of power required to transport this pay cargo by flying boat would be extraordinarily large. Each boat would be capable of carrying 1,000 pounds of payload. Each boat would have engines developing 6,000 horsepower. One horsepower would be equivalent to 33,000 foot-pounds of energy per minute. Applying this formula to the flying boat and utilizing seventy per cent of its gross power at cruising speed, approximately 138,000,000 foot-pounds would be developed each minute. Inasmuch as the boat would carry only 1,000 pound payload, it is a matter of simple arithmetic to determine that for each pound of payload transported, 138,000 foot-pounds of energy would be required each minute.

Contrast this with the small amount of energy required for the operation of the rigid airship. Each airship would carry a 16,000-pound pay cargo. Its engines would generate 4,800 horsepower. At cruising speed approximately 80,000,000 foot-pounds of energy would be developed each minute. Therefore, for each pound of payload transported, only 5,000 foot-pounds of energy would be required, or a power ratio of almost twenty-eight to one in favor of the airship.

In order to carry an actual payload equivalent to that of the airships, these seventeen flying boats would have to make 3,264 trips one way per annum as compared with only 204 trips negotiated by the airships.

With these performance figures available for the two types of craft performing the same volume of work per annum, it is interesting to compare their respective operating costs per pound of pay cargo carried. These estimated costs are not guaranteed to be exactly what they would be in actual operations. There is no authentic experience at this time on which to base an absolutely accurate estimate. It is believed, however, that no important or essential items have been overlooked. In the following estimate it is assumed that 100 per cent of the pay cargo space is utilized, that the total volume is 3,264,000 pounds of pay cargo per annum, and that the fuel consumption is based upon operation in still air. All items are included such as executive and administration expense, advertising, transportation, maintenance, terminals, insurance and depreciation. A conservative estimate of the cost per pound of pay cargo for the flying boat is $7 and for the airship $1.60.

In order to carry the gross pay cargo, the flying boats would consume $6,150,000 in fuel per annum. The airships would consume only $430,000 in fuel, plus the additional cost for helium, amounting to $383,000. In other words, by spending $383,000 for helium the airships would save $5,720,000 in fuel. Subtracting the helium cost from this latter figure we would have a net saving of $5,337,000. Consequently, each dollar spent on helium would save about $14 in fuel. This is proof conclusive that the much heralded high cost of helium has been grossly exaggerated.

It is recognized, of course, that no vehicle engaged in commercial transport consistently carries a 100 per cent payload. Therefore, for the purpose of estimating a fair

(*Continued on next page*)

FOLLOW THE LEADERS
and you're bound to be right

ROGER W. BABSON
Financial and Advertising Authority
"Every live and growing concern advertises in some way or another. To stop advertising would be to stop growing."

JOHN N. WILLYS
Former President Willys-Overland, Inc.
"I can hardly conceive of any manufacturing business rising to the full limit of its opportunity without advertising. It is my honest belief that advertising must be counted upon to do considerably more than half of the actual selling."

JAMES D. TEW
President, B. F. Goodrich Rubber Company
"Let an industry that has advertised extensively reduce this advertising or cease to advertise and its volume starts on the down grade."

HERE is sane advice from business leaders in different industries which can be applied very appropriately at the present time to aviation.

At the first sign of a little let-up in the market, a few companies assume a conservative program, so they cut down their advertising or cancel it altogether. Result? Business continues to go on, but someone else grabs off the business they were formerly getting. Consequently, it is twice as hard for them to regain the position they once held in the market. Some drop out altogether. We've all seen it happen.

This rarely happens to the leaders, though; they don't allow it. That's how they attained first place. Rather than relax, they increase their sales efforts. They hammer away consistently and conscientiously.

You know who they are. You've seen their advertising month-in-and-month-out, year-in-and-year-out, in AERO DIGEST. They were small advertisers once, but by keeping constantly at it they climbed to the top. They are the biggest advertisers today. Advertising has so firmly entrenched them in the aviation market that their names are unforgettable symbols of the products they sell.

Advertising, on the other hand, can be a waste if it is not judiciously handled. You can't get results unless your message reaches the maximum potential market. Nor can you increase advertising's power by duplicating one circulation with another. Those advertisers who are using AERO DIGEST consistently are safe on all points.

AERO DIGEST carries the advertising of more companies in the aviation business than any other two magazines combined. So many advertisers can't possibly be wrong! Notice that AERO DIGEST carries, almost without exception, the advertising of every leader in the industry. *Follow the leaders and you're bound to be right!*

AERO DIGEST
220 WEST 42ND STREET
NEW YORK CITY, N. Y.

Quicker
and more
Economical
Aircraft Assembly with Hartshorn Tie Rods



SQUARE SECTION TIE RODS can be adjusted with the wrench applied at any point along the rod. Tight corners are no longer troublesome. The flat faces permit making rods fast at intersections. A glance along the rods shows up even the slightest torsional strain, so there's no danger of twisted, weakened rods.

STREAMLINE TIE RODS are light and strong. They offer little resistance to the wind, thereby increasing speed and reducing fuel consumption.

Brace every ship you build or fly with

Hartshorn Est. 1860 **AIRCRAFT TIE RODS**

STEWART HARTSHORN CO.
250 Fifth Avenue New York, N. Y.

(*Continued from preceding page*)

and minimum price per pound to charge for such service, it is assumed that the average cargo space sold for the airship would approximate seventy-five per cent of its payload capacity, whereas for the flying boat, because of its low capacity of 1,000 pounds, the full 100 per cent would be utilized.

Let us assume also that each type of craft would complete eighty per cent of the scheduled trips per annum. On this basis the combined load and service factor for the airship would be sixty per cent and for the flying boat, eighty per cent. On this basis, the actual cost per pound of pay cargo for the airship from California to Hawaii would be $2.67 and for the flying boat, $8.75. The above figures do not include any allowance for profit on capital invested, but the operating cost ratio in favor of the airship is 3.3 to 1.

It is important to emphasize that this differential in cost between the two types of craft does not begin to disclose the economic advantages of the airship over the flying boat, for the simple reason that the flying boat herein described, according to the conclusion of eminent authorities, seems to approach its economic limit in size. On the other hand, the 100-ton airship is relatively small as airships go, and if a super-airship of 300 tons gross lift were employed, the cost per pound of cargo would be reduced to approximately $1.25. Therefore, in comparing the super-flying-boat with the super-airship, the differential in tariff in favor of the airship has a ratio of about 7 to 1.

Furthermore, it should be emphasized that the airship would carry a fifty per cent fuel reserve against head winds, which conforms to standard practice in the older forms of transportation. On the other hand, the flying boat used in the comparison carries only twenty-one per cent fuel reserve. If it should be loaded with a fifty per cent fuel reserve, not only would it be devoid of pay cargo, but it would be difficult to get off the water under even the most favorable conditions.

Now the question will be asked, "If all these advantages in favor of the airship are true, why has not its development progressed more rapidly?"

In the first place, prior to the World War, practically all rigid airship development was confined to Germany. At the conclusion of the war, the Versailles Treaty halted this excellent development and for a period of about six years this highly specialized talent remained dormant.

In the second place, a world-wide survey of aircraft activities reveals that, for each $50 spent on airplane development, only one dollar has been spent on airship development. In the United States, for each $100 spent

(*Continued on next page*)

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THE WORLD'S GREATEST AERONAUTICAL CENTER

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11 Years of Successful Aviation Training
An Unbroken Record for Safety

SOUTHERN AIRWAYS SCHOOLS

502 AZTEC BUILDING SAN ANTONIO, TEXAS



And for the glider enthusiasts, WACO offers the WACO Glider. It has many exclusive design features and is so sturdily built that it will stand almost any amount of abuse. It is another typical WACO value, priced at only $385 complete, boxed for shipment. A descriptive folder, giving full details, is yours for the asking.

You won't find its Equal

The great new WACO "Model F" is a matchless Value... satisfying in performance . . . beautifully finished . . . completely equipped.

You won't find another airplane on the market, at anything near the price of this latest WACO, that gives such satisfying performance... that is so incredibly easy to fly . . . that is such a delight to own.

If you'll "take a hop" in a WACO "Model F" . . . if you'll note its refinements of design and finish... you, too, will be amazed that so much airplane can be bought for such a moderate price.

May we send you complete details?

The WACO Aircraft Co., Troy, Ohio

WACO AIRPLANES

"ASK ANY PILOT"

C-20







There are more WACO's in commercial service than any other American make.



Reasonable Tuition Rates!

No other civilian airplane school in America offers mechanical and flying training on such elaborate equipment at anywhere near our reasonable tuition charge.

LEARN AVIATION

at Lincoln Where Lindbergh Learned

You, too, come to Lincoln! Come now—to the famous Lincoln Airplane & Flying School.

Government Approved School

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(*Continued from preceding page*)

on airplane development, only one dollar has been spent on rigid airships. This explains in part why the development of lighter-than-air transport is the most neglected engineering art in the realm of aeronautics.

In the third place, when one attempts to develop the rigid airship he must think in terms of millions of dollars instead of thousands, as for a new type of airplane. His efforts must cover a period of years instead of a period of a few months.

In the fourth place, each disaster which has occurred in the experimental development of airships has caused a decided drawback so far as securing additional funds for prosecuting the work at hand was concerned. The cumulative effect of these disasters has been more serious to airship development than have the most tragic airplane disasters to the development of heavier-than-air craft. This is the result of the fact that the enormous size of the airship so captures the public imagination that the influence of any accident is multiplied accordingly.

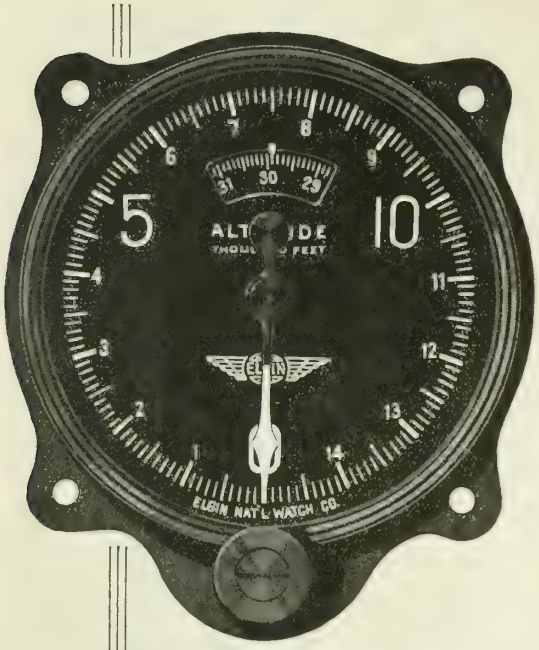
Finally, the lack of adequate government support in the past has retarded the development of the airship. However, the early enactment of Federal legislation providing for the award of exclusive long-term contracts to commercial airship companies for the transport of ocean mail at a price that would yield a fair return on the investment, would give the same encouragement to the airship development that the air mail contract act of 1925, as applied to transcontinental service, gave to airplane development.

Let us be reminded that modern civilization differs from its predecessors in its world reach. It progresses on the wheels of transportation. The lands best developed in social structure and in the use of the equipment of this modern scientific-industrial era are the lands that excel in modern transportation.

Frontiers exist, and with them certain social customs and traditional regimes have their sway. But air transport is rapidly spreading through these frontiers. Air commerce may be impeded by prejudice, tariffs and national policies, but it is not stopped by them.

Certainly the record of progress of the airship would be entirely different if an amount of money equal to that spent on the airplane had been available for its development.

Of course, the loss of the British R-38 and the U.S.S. *Shenandoah* caused many people to become skeptical in their appraisal of the value of lighter-than-air craft, but they should be reminded that every great scientific development has come many times to the crossroads of doubt where people have stood unequally divided, most of them wanting to turn back and a few wanting to go ahead.



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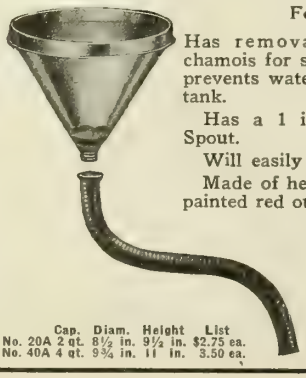
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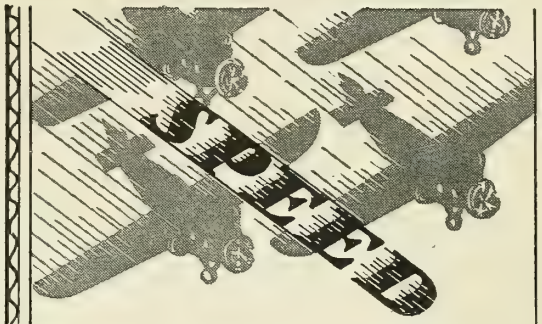


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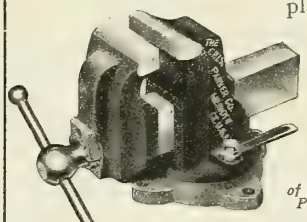
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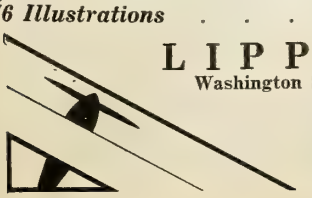
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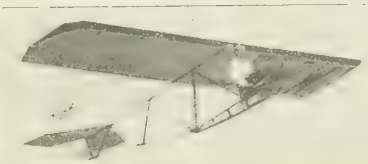
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AIR—HOT AND OTHERWISE

(*Continued from page 66*)

tinguished as the only American institution linked to a live issue to do so.

How ridiculous it seems to say that some American aviator has broken every altitude record and in the next breath admit that the N. A. A., titular organization of American aeronautics, has lost six more of its thirty-one conscious members!

How astonishing to find a statement of air mail increase on the first page of the morning newspaper and then read that the National Exchange Club—and not the N. A. A.—was the organization which fought for it, won it, and celebrated the victory!

How incongruous that America's fast planes are scooting here and there with payloads, but that a considerable proportion of the meager membership still clinging to the N. A. A. habitually fails to liquidate its trifling annual dues, doubtless because it feels that payment, considering how things today (as yesterday) proceed within the organization, would be throwing good cash after bad!

The N. A. A. had a great chance in 1926. We saw it, and, seeing it, as is our custom, wrote on the subject.

The N. A. A. was far too sound asleep to read or heed, or perhaps too busy down in Washington playing brass-button, brass-button, who's got the brass-button—and the epaulettes—to have time to think, or care.

But still it can be saved. Another chance approaches. This is the way to use it. At the coming meeting take the headquarters away from Washington. Take the management out of control of psychologically psychopathic-minded organization politicians. Remodel things until the association ceases to be a kit of rubber-handled tools for job-holders and becomes a buzzing power plant for American aeronautical enthusiasm and progress, such as its founders meant and thought it would be.

Let those chapters which are full of energy and which are thinking of the future of the N. A. A. send to the approaching Chicago convention delegates instructed to vote wisely for necessary changes, making them THE changes which will be most effective.

Send them pledged to elect as president William P. MacCracken, Jr., whom we all know and trust. There can be no doubt that he has the best interests of American aviation enshrined in his heart. He is able, energetic, expert at this special art and has a detailed knowledge possessed by no other individual.

He is a competent executive and a square-shooter.

And then, after having made Bill MacCracken president, make Orville Wright honorary president for life, thereby doing him a little honor which, as the living father of our

(*Continued on next page*)



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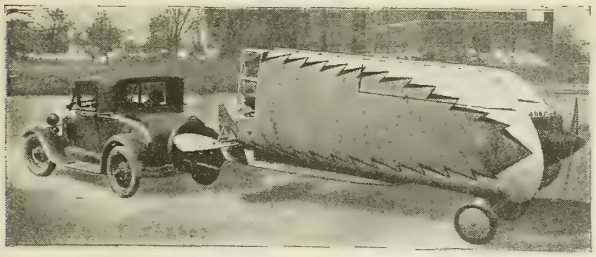
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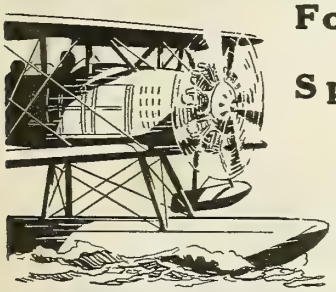
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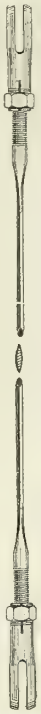
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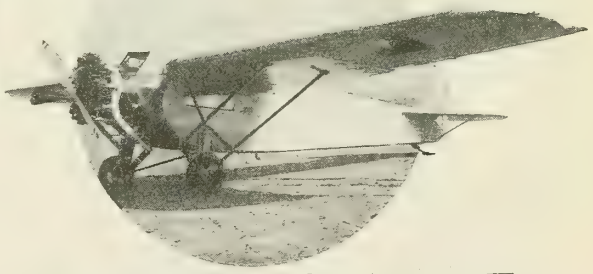


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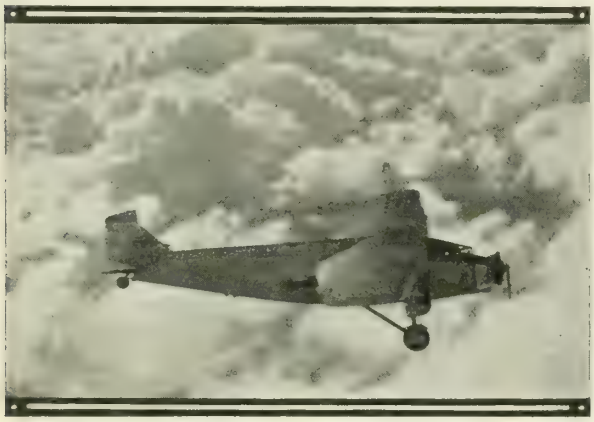
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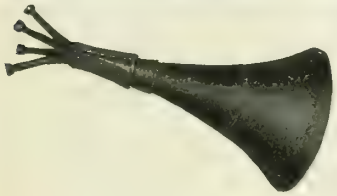
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(*Continued from preceding page*)

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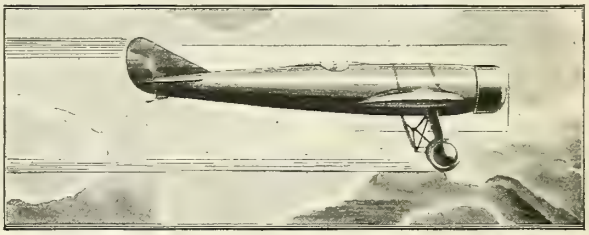
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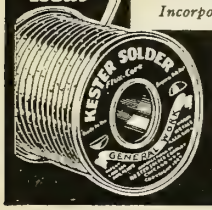
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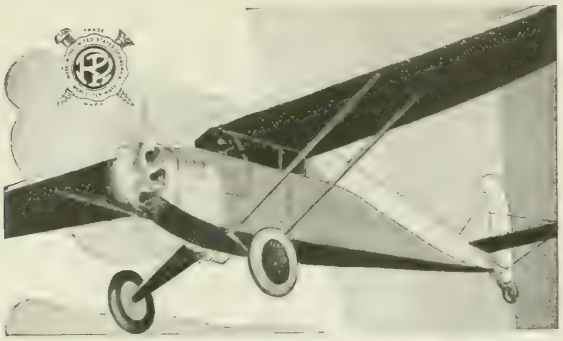
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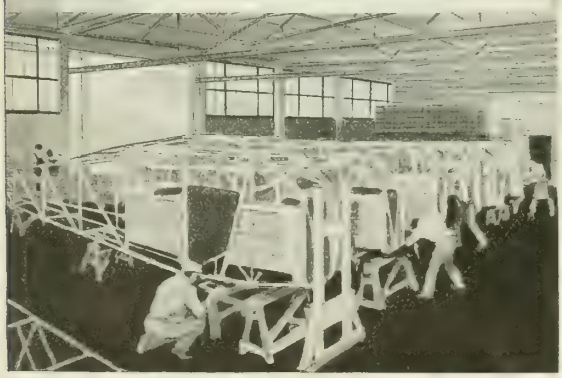


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(*Continued from preceding page*)

supposed to strive, and there are enough real friends of aviation in the industry, interested in having the N. A. A. brought back to life, to see to it that he would get it every month until the organization becomes prosperous enough to pay it easily. That won't be long, if it is given a chance.

The first essential task of this general manager would be to tie cans to the would-be's. There are many who would make a loud clatter while fleeing, but they would not return.

With such a program, the organization can be prosperous enough in six months to finance a real program and be wholly self-supporting. This can be accomplished easily if the N. A. A. convention selects officers who do not seek their posts with the ulterior motive of using them for political preferment or the achievement of cheap social prestige, and who will fight the organization's battles without consideration for some government job which tempts, and without worries as to precedent at Washington's political dinner tables.

THE CUCKOO CLUB

(*Continued from page* 54)

and remark casually that the wings only bent back about six inches in that last inverted loop, instead of seven and a half inches, as they did in the loop before.

However, the commercial operators and the pilots flying cautiously and safely really have their rights. Not that I care a snap about the rights of sane commercial aviation, to tell you the truth. But I like to be fair. So I have to admit that they *do* have their rights. And I'm all for giving them those rights and not interfering with their enjoyment of them by any wild flying I may do. In short, what I propose to accomplish with the Cuckoo Club is to differentiate in the minds of the public between safe and sane flying, which is done by the airlines and the majority of the operators, and the sort of flying that we really intrepid birdmen fancy.

For instance, if I wish to get a skin-full of Scotch and then go and hurl a flying boat into the ocean, who is to say me nay? I have a perfect right to do it. But I admit I have no right to injure sane commercial aviation simply because I got a bun on and went over-bold on myself. So I'm not going to injure it. What I am going to do is join the Cuckoo Club in advance, announce to the world that I am a Cuckoo in good standing, and not to be confused with the sort of pilots who fly passengers and mail, day after day, month after month, without killing anyone.

That's why I've founded this club—and I expect a flood of applications, because I know at least two dozen pilots

(*Continued on next page*)

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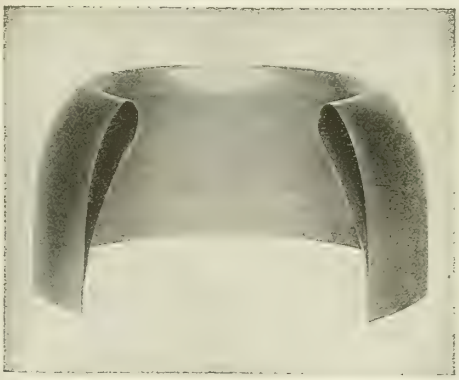
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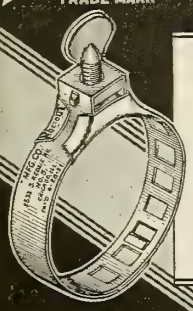
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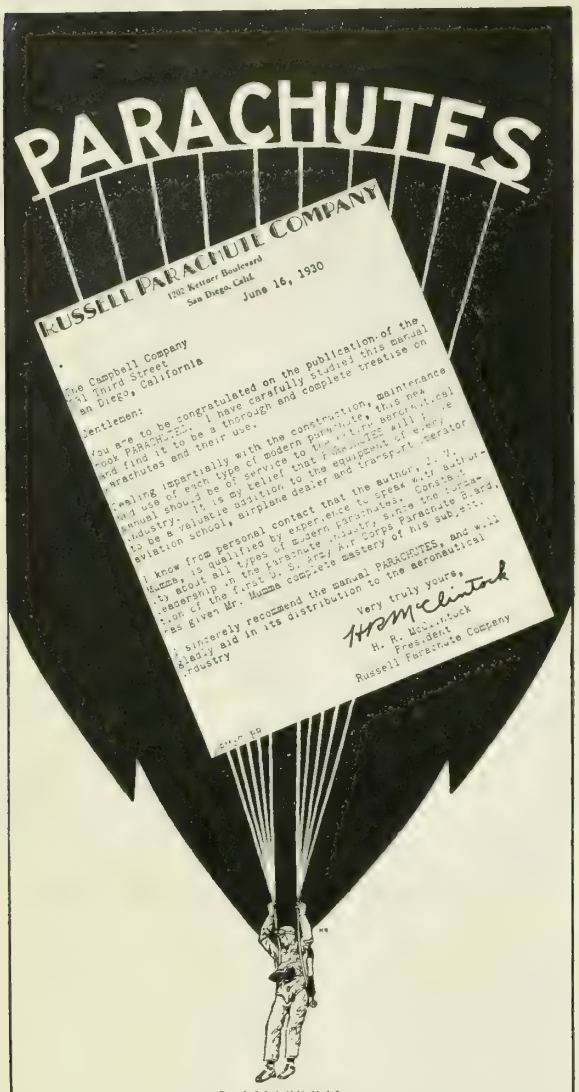
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(*Continued from preceding page*)

who are eligible right now. In fact, if they don't join I shall, during the coming months, mention them by name in AERO DIGEST, pointing out the special stunt they pull off that entitles them to membership.

But before I go on to point out the amazing value to aviation that this club will be, let me explain where I got the idea and the name. I was reading Webster's Unabridged Dictionary for bridge hounds—I always go in for light reading in the summer—when I came across the following: "Cuckoo—A bird belonging to a large family (*Cuculoidae*), many species of which, as the common European cuckoo (*Cuculus canorus*), deposit their eggs in the nests of other birds to be hatched and cared for. Any of various birds similar to the English cuckoo, as the American yellow-billed cuckoo (*Coccyzus americanus*) or the black-billed cuckoo (*Coccyzus erythrophthalmus*)."

Well, I'd been thinking of the formation of a club to boost the Crash of the Month treasury, and right there I saw that I had a fitting name. The CUCKOO CLUB! What could more accurately and beautifully express the idea I wanted to convey? The sort of pilot I am referring to certainly "belongs to a large family," as Webster puts it. His name is legion, in fact. Every airport has one, sometimes two or three. And when he uses himself up—for Cuckoo pilots are expendable material—another one of the large family puts in an appearance.

And as for that part about the cuckoos "depositing their eggs in the nests of other birds to be hatched and cared for," well, the Cuckoo pilot certainly deposits some very unsavory eggs in the nest of commercial aviation for the ordinary pilots to hatch out or shove out of the nest.

However, by forming all this large family of pilots into a club, and by telling the public all about the club, we'll take the burden of blame from other aviation activities. But we must be careful to distinguish ourselves from the rest of aviation, so only we will get the credit for what we do. I therefore propose that we paint on the sides of our fuselage and wings a spirited likeness of a cuckoo calling to its mate. What will be the result?

An airplane is observed dashing about just over the housetops. It dives down and its zooms up, it loops and it rolls, it flies on its back and sideways, to the great admiration of several small boys. Finally, the plane rolls out of a loop at 300 feet, goes into a spin, and crashes—all of which is just in a spirit of fun, you know.

Well, the pilot steps out—perhaps—and the ever-present reporter dashes up, note-book in hand. "Is this a mail

(*Continued on next page*)



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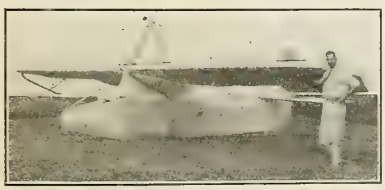
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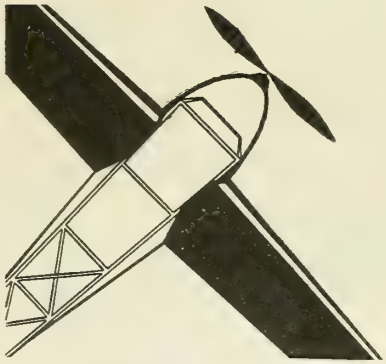
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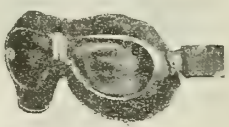
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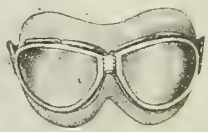
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(*Continued from preceding page*)

plane? A passenger plane? A—what is this, anyhow?"

"This is a wreck," says the member of the Cuckoo Club, with pride and dignity. "It is a crash in no way connected with the airlines, the air mail, flying schools, or anything else of a sordid commercial nature. It is a presentation of the National Cuckoo Club, over a wave-length of six glasses of Scotch and a couple of rye highballs."

"And this is not, you tell me, a part of commercial aviation?" inquires the reporter.

"Certainly not!" replies the Cuckoo indignantly. "This is my own idea, so don't credit it to air transport. See the cuckoo on the side of the fuselage—or what was the fuselage—that torn part there? That's the insignia of our club, designed by a man who did outside loops."

"And you are not a commercial pilot?"

"Oh, no—you couldn't make a commercial profit out of my kind of aviation in fifty years. I do help the trucking concerns and the railroads, who take my plane back to the factory after each good flight—but it's hardly commercial for me."

"Who are you, anyhow, if anything?" asks the reporter.

"I am a member of a large family (*Cuculoidae*). I am not, however, the common European cuckoo (*Cuculus canorus*)—if you're up on Latin. Nor am I *Coccyzus erythrophthalmus*, much as you might suspect it. I am, on the contrary, *Coccyzus americanus*, or, in plain words in case your Latin has slipped its leash, I am a plain American yellow-billed cuckoo in good standing."

You folks get the idea, do you? We dashing daredevils of the skies can now do all the dime-novel flying we want to without, in most instances, hurting anything except ourselves—and we're practically without feelings. In fact, we pride ourselves on coming apart in the morning and growing together again after sundown. We actually like it.

Plain commercial aviation can go its way, and we'll go ours. The newspaper publicity following our crashes will not hurt aviation. The papers will report of a crash, "CUCKOO CLUB MEMBER COLLECTS CONTUSIONS.—An airplane pilot calling himself Coccyzus Americanus today knocked the spire off the new Chrysler Building and crashed on the roof of a nearby skyscraper. He denied indignantly the suggestion that he was engaged in commercial aviation, and declared that for years he had been endeavoring to knock something off of something, and that at last his efforts had been crowned with success.

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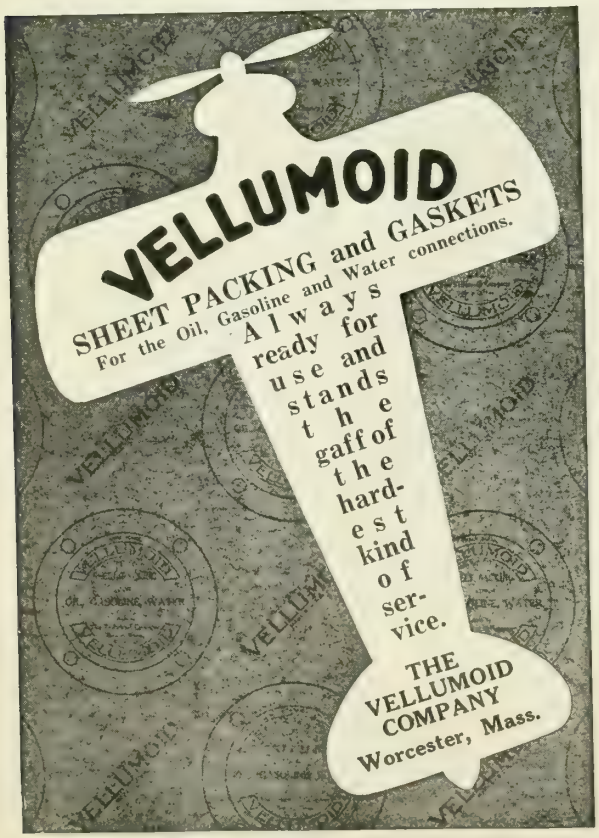
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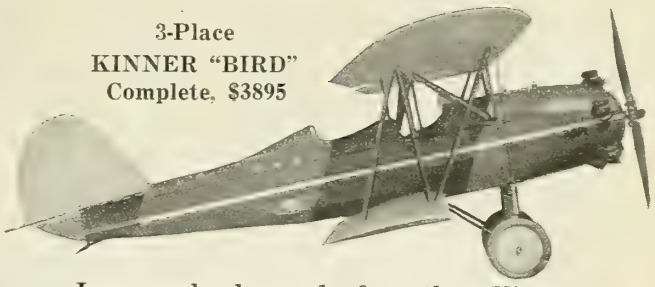
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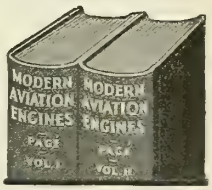
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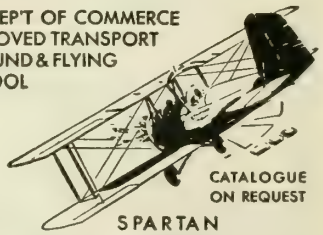
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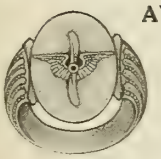
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EXPERIENCED NEWSPAPER MAN, university graduate, versed in aviation, seeks connection with aircraft manufacturing or air transport company in publicity or traffic department. Position must offer responsibility and good future. AERO DIGEST, Box 958.

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YOUNG MAN with 4 years experience in airplane and glider construction and design wants to make connection with company bringing out new ship, man or men who wish to develop light plane or glider, or as instructor in ground school. Have managed own company, designed and built three types planes and several gliders. Capable of taking charge of construction or management of factory. At liberty after July 15. Write Designer, Box 185, Rochester, Indiana.

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MODEL GLIDER, wing spread 42 inches. Controlled from ground. Flies at great height. Blueprints for same 25c coin; circular on request. Spee Dee Model Co., Box 80, Jamaica, N. Y.

MEAD GLIDERS are making glider history. The "Rhon Ranger" construction kit is only $89.50 complete. See our advertisement on page 231, or send 10c to Mead Gliders, Dept. A2, 12 S. Market St., Chicago, Ill.

WANTED

WANTED: Three OX-5 Travel Air wings. Must pass inspection. Ferdinand Wise, 2626 Riopelle St., Detroit, Michigan.

CHALLENGER-ROBIN WANTED: Must be in first class condition. Want to trade Command Aire-Warner if possible. Give full information in first letter. Jefferson Airways, Inc., Jefferson City, Missouri.

WANTED: J5 or J4 Wright Whirlwind motor cheap for cash. FOR SALE: 1929 Licensed Davis V3 monoplane. Will take automobile as part payment. Harry Brown, 138 Ringold St., Dayton, Ohio.

WANTED: Heath Super Parasol, less motor and prop. Factory built job preferred. Must be in A-1 shape and a bargain. AERO DIGEST, Box 960.

MISCELLANEOUS

GLIDER INSTRUCTORS are in great demand everywhere. Build your own glider and qualify. See Imperial Aircraft advertisement page 20, this issue. Imperial Aircraft Corporation, Department B, Camden, New Jersey.

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INVENTIONS WANTED: Patented, unpatented. If you have an idea for sale write HARTLEY, Box 928, Bangor, Maine.

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DISTRICT SALESMEN, MANAGERS for organization now forming to distribute gliders and light powered planes. Knowledge of aviation desirable. State age and qualifications. Address Leonard Motorless Aircraft Co., Inc., Box 66, Grand Rapids, Michigan.

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PLANES FOR SALE or trade: 2 Parks P.1's; 2 Swallow P.T.'s; 2 Waco 10's; 1 Command Aire-Warner. All in perfect condition; licensed. Cash or terms, or trade on 6 place cabin. Jefferson Airways, Inc., Jefferson City, Missouri.

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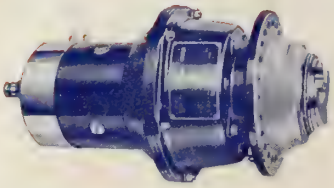
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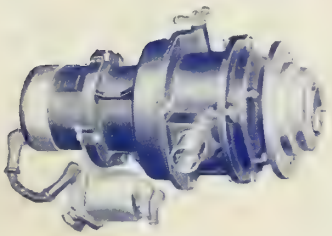


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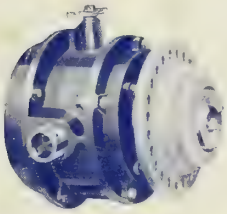


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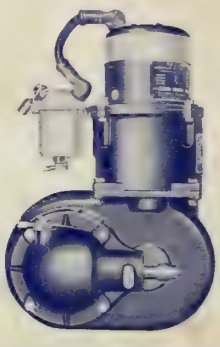
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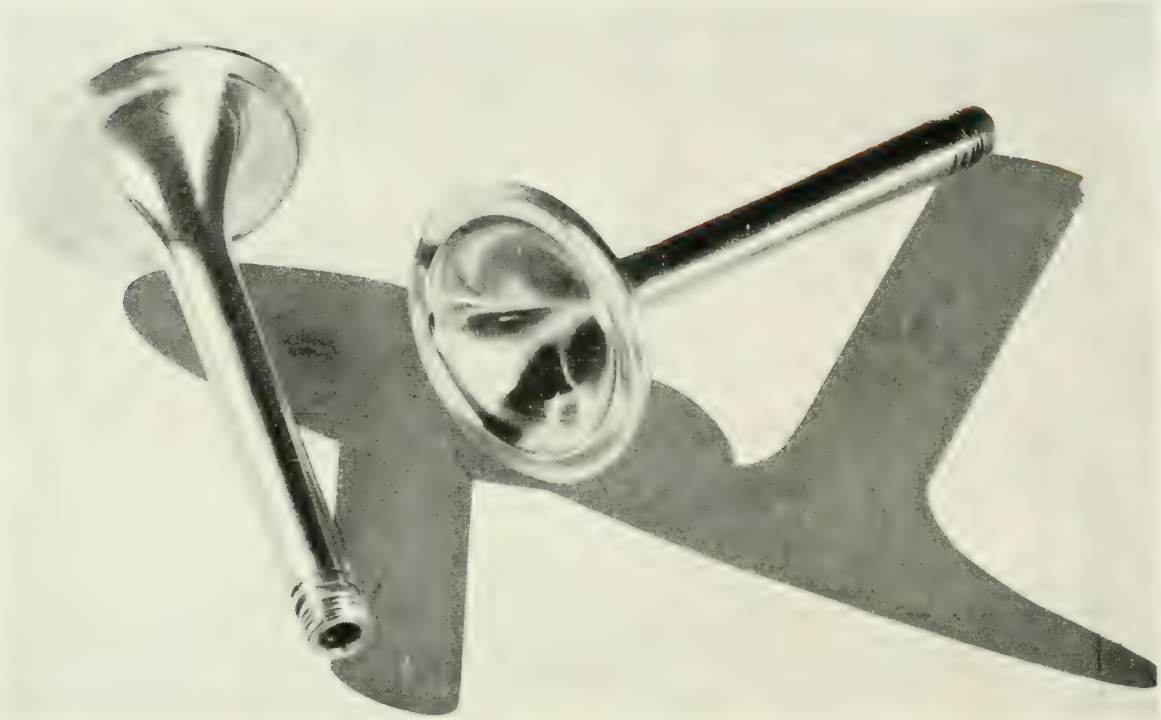
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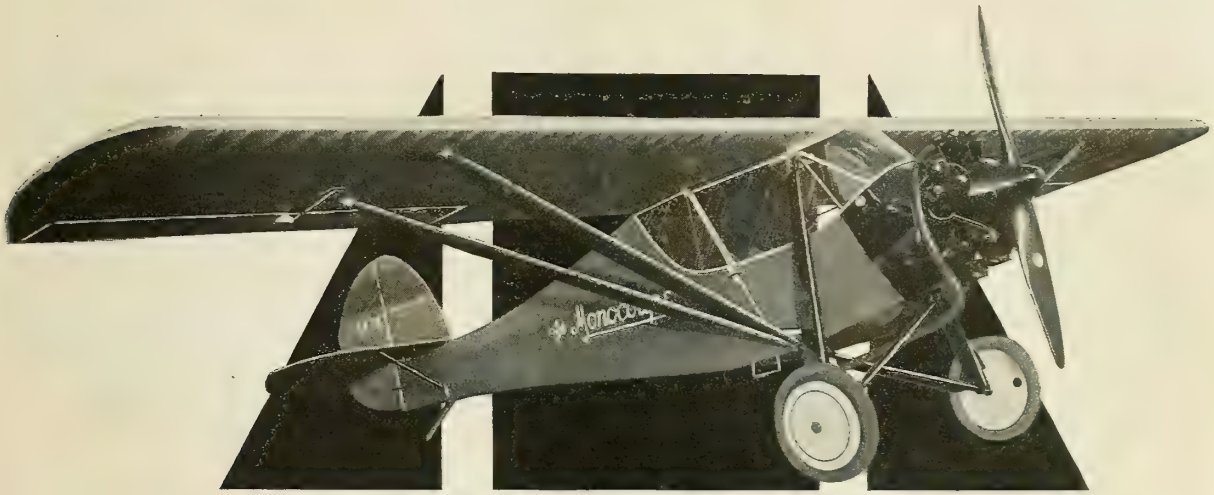
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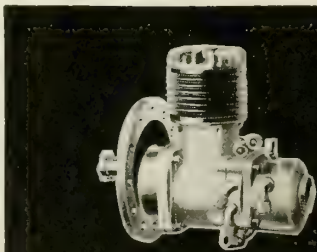
A long list of prominent private plane owners as well as leading aeroplane manufacturers select the Heywood Starter because of its ease of operation, its consistent dependability under all conditions and because of the great convenience afforded in starting from the pilot's seat.

The injection fuel principle—light weight—few moving parts—are some of the features of this most effective Starter.

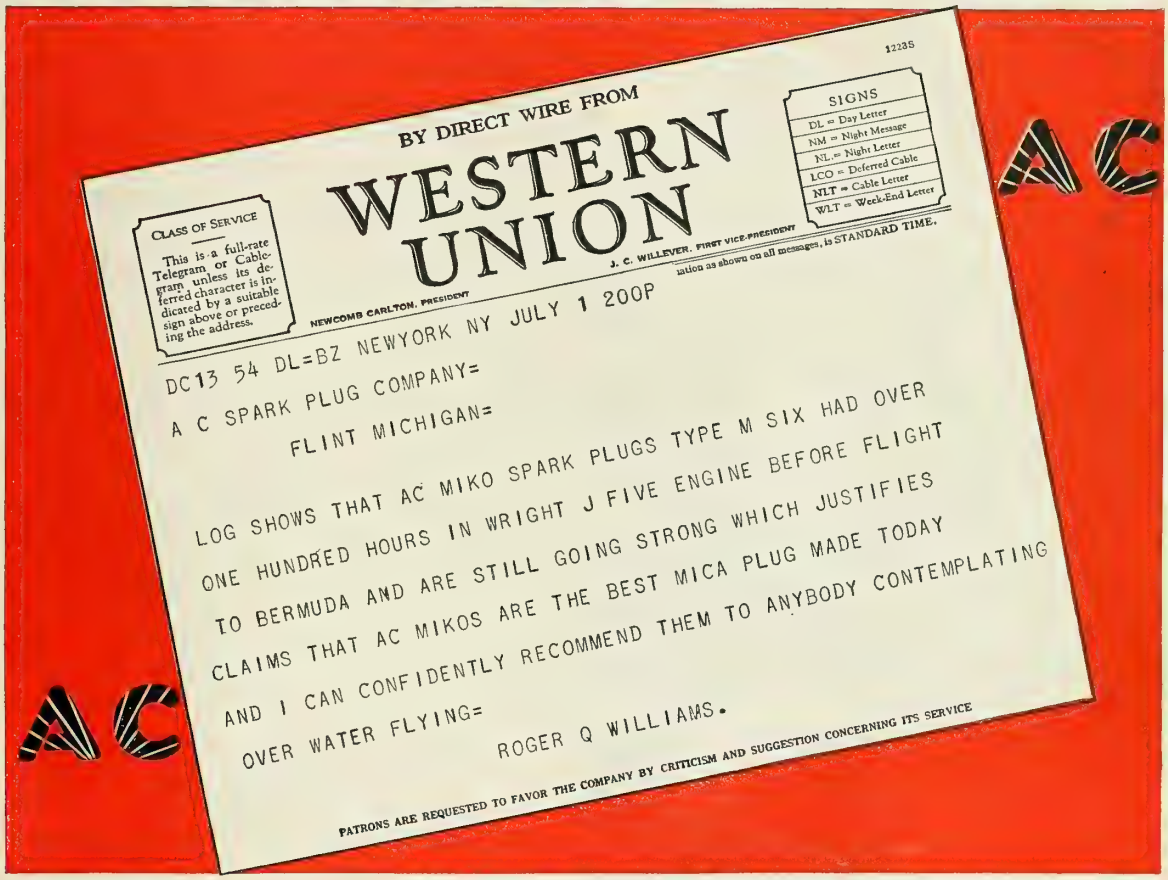
Write for complete information.

SKY SPECIALTIES CORPORATION
3651 Hart Avenue Detroit, Michigan

SKY SERVICE



Williams relied on AC Miko Spark Plugs in non-stop flight to Bermuda and return—one more triumph added to AC's unparalleled record.



This is just one more success added to the historic series of endurance flights completed with AC Spark Plugs.

This record includes Lindbergh's trans-Atlantic flight, Chamberlin's non-stop trip to Germany, the Maitland-Hegenberger classic hop to the Hawaiian Islands, as well as the trans-Atlantic conquests of Amelia Earhart, Schlee and Brock, Byrd, and Williams' previous flight from Old Orchard, Maine, to the coast of Spain.

From such performance has come the universal acceptance of AC as *the better spark plug.*

In advanced design, in super-quality of materials, in painstaking workmanship, in proved ability to withstand exhaustive tests, the new AC Miko Spark Plug is literally in a class by itself.

Put in a new set of AC Miko Spark Plugs and enjoy easier starting, faster acceleration, shorter take-off, smoother performance and highest efficiency for twice the number of hours ordinarily attained.

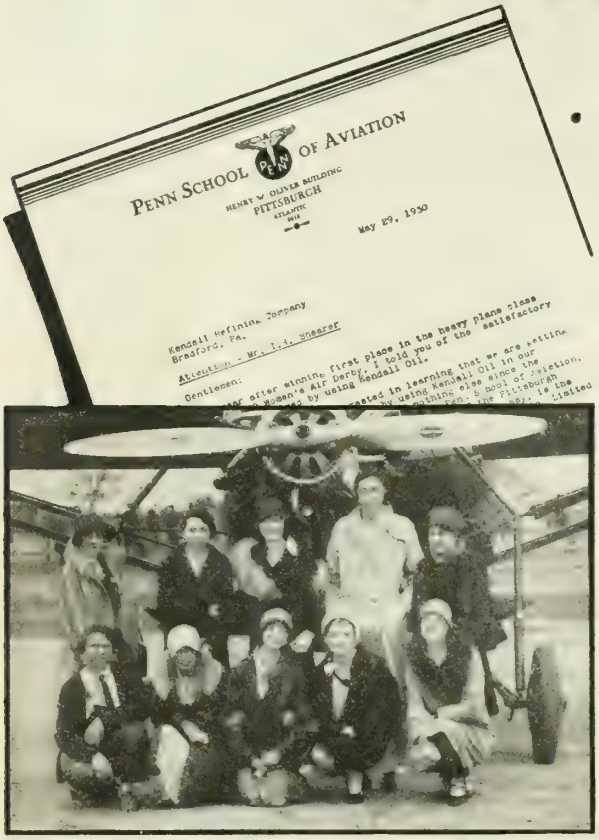
AC-SPHINX
Birmingham
ENGLAND

AC Spark Plug Company, FLINT, *Michigan*

AC-TITAN
Clichy (Seine)
FRANCE

AC SPARK PLUGS AC THERMO GAUGES AC AIR CLEANERS AC OIL FILTERS AC FUEL PUMPS AC GASOLINE GAUGES
AC GASOLINE STRAINERS AC AMMETERS AC OIL GAUGES AC SPEEDOMETERS AC COMPLETE INSTRUMENT PANELS

FROM THE .... New



A group of student pilots of the Women's Division. They know Kendall by name and performance.

GROUND school and flying instructors know from experience the absolute dependability of Kendall Oil. They recommend it to their students, demonstrate it in flight, and use it to safeguard the inexperienced from engine failure and the possibility of forced landings.

Two of the country's well known pilots, training executives of the Penn School of Aviation, Pittsburgh, give their very definite "OK" to Kendall lubrication in training planes:

Lieutenant Rosenberger, Director of Flying Training, says: "We find that regardless of how it is used or abused, Kendall Oil is still in very good condition even after being used for longer periods than other oils; draining periods are less frequent and the intervals between overhauls are extended to a much longer period, so that we feel your oil is actually an investment . . . We consider it of such importance that we lay particular stress upon it in our ground school course."

Louise Thaden, Director of Women's Division, writes: "Last year after winning first place in the Women's Air Derby, I told you of the satisfactory results I received by using Kendall





Louise Thaden, winner of the 1929 Women's Air Derby, Director of Women's Division of Penn School of Aviation.

Lieutenant W. S. Rosenberger, well known pilot and Director of Flying Training, Penn School.



A large group of student pilots of Penn School. A part of their training is a knowledge of good lubrication—Kendall Oil.

Use the Air Mail!

KENDALL

GROUND UP
Records of Reliability

Oil. We are getting the same satisfaction from Kendall Oil in our training planes—in fact, have used nothing else since the inception, more than a year ago, of the Penn School of Aviation."

When, also, there is a record to be made, wise pilots put their trust in Kendall Oil. They know by experience that from take-off to landing, the motor protected by Kendall will give its best.

Again this is proved in the non-refueling record flight of S. C. "Jiggs" Huffman, Operations Manager, Embry-Riddle Company, Cincinnati, in a Kendall lubricated Aeronca plane. Mr. Huffman says:

"I believe you will be interested to know of the splendid performance of Kendall GG Oil during my solo non-refueling endurance flight. The consumption was very low and, although the engine has not yet been torn down, it was running perfectly at the end of 25 hours, 38 minutes and 45 seconds in the air.

"My selection of Kendall for this flight was governed by the excellent results achieved in the past under similar conditions."

Kendall Oil has its source in the world's finest crude oil—the Bradford Grade of Pennsylvania. Kendall processes are thoroughly modern and scientific, freeing the oil of wax and other harmful agencies, insuring a product of uniform perfection. Kendall Oil will give a full thirty hours of service in the air without necessity of changing. Merely maintain the proper oil level.

For complete information regarding the excellent lubricating qualities of Kendall Oil and a list of airports where it is sold, address, Kendall Refining Company, Bradford, Pennsylvania.



S.C."Jiggs"Huffman, Operations Manager,Embry-Riddle Company.

EMBRY-RIDDLE COMPANY
SUBSIDIARY OF THE AVIATION CORPORATION
LUNKEN AIRPORT
CINCINNATI

June 26, 1930

Kendall Refining Company
Bradford, Pennsylvania

Gentlemen:

I believe you will be interested to know of the splendid performance of Kendall GG Oil during my solo non-refueling endurance flight. The consumption was very low and, although the engine has not yet been torn down, it was running perfectly at the end of 25 hours 38 minutes and 45 seconds in the air.

My selection of Kendall for this flight was governed by the excellent results achieved in the past under similar conditions.

Yours very truly,
S C Huffman
Stanley C. Huffman
Operations Manager



The Aeronca plane in which Huffman set a new record.

BUY AT THIS SIGN
PENZBEST
KENDALL
MOTOR OILS
IT IS YOUR PROTECTION

OIL

REFINED FROM 100% BRADFORD GRADE OF PENNSYLVANIA CRUDE

7 GREAT *aviation training* COURSES

Now offered by

RYAN



Note: Instruction at the T. C. Ryan Flying School is given by a corps of instructors under the personal supervision of T. Claude Ryan, original designer and builder of Ryan monoplanes; founder of Ryan Airlines, Ryan Flying Company; president of T. C. Ryan Flying School and T. C. Ryan Aeronautical Company.

Students at the T. C. Ryan Flying School have the advantages of 7 outstanding Aviation Courses from which to choose. These courses have been especially designed by T. Claude Ryan and his associates to give the highest type of training available in America today.

San Diego's fresh, cool breezes, ideal flying weather, and systematic RYAN training schedules enable RYAN *summer* students to receive maximum flight training in the shortest possible time.

Course No. 1. PLANE—plus TRANSPORT TRAINING

This course is the latest development in aeronautical training. A new 1930 Cirrus-motored Great Lakes airplane for your personal use . . . and the famous *U. S. Goernment Approved* RYAN master course of training, qualifying for a Transport License and preparing you for complete mastery of the air.

Under this plan you receive the *complete* RYAN Transport Course and the permanent ownership of this new, latest type airplane—for a total price of only $4,460. This is an ideal course for sportsmen and for men who wish to give themselves the best possible training and equipment for successful careers in aviation.

Course No. 2. SHORT COURSE—plus PLANE

A new Great Lakes Sport Trainer and the complete RYAN Limited Commercial Course.

Course No. 3. RYAN TRANSPORT COURSE

Two hundred hours of RYAN flight instruction in the latest type of planes—with 2,000 miles cross-country flying over mountains, desert and ocean shore; also night flying, 20 hours of cabin ship instruction and 400 hours of thoro Ground School Training.

Course No. 4. RYAN LIMITED COMMERCIAL

Fifty hours of RYAN flight instruction—and 4 months of Ground Training. The successful completion of this course qualifies the student for a Limited Commercial Pilot's License. Holders of this license can engage in aviation commercially.

Course No. 5. RYAN PRIVATE PILOT'S

Twenty hours of flying with approximately 10 hours of dual and 10 hours of solo flying; also 200 hours of Ground Training. This course qualifies the student to engage in any kind of non-commercial flying. A RYAN Private Pilot's Course, without ground training, is also open to students who can pass examinations on Ground School subjects.

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Refresher courses have been arranged for former war-time pilots and students from other schools who now wish to avail themselves of the higher training standards at RYAN.

Course No. 7. MASTER GROUND SCHOOL

768 hours of lecture, laboratory and shop practice at our affiliated Pacific Technical University are available to RYAN students who wish intensive training in ground school subjects only.

When to Enroll

Due to the necessity of ordering each student's plane approximately one month in advance for the "Training—plus Plane" Course, we recommend that you write for further particulars immediately to avoid future delay. Other classes are now enrolling for immediate training.

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The T. C. Ryan Flying School invites the attention of those who are interested only in the highest standards of aeronautical training. Ryan Approved Training costs less than training at some schools that have not been approved.

Courses include:

**The Transport Course . . . . . 200 Flying Hours*
**The Commercial Course . . . . . 50 Flying Hours*
†The Private Pilot's Course . . . . . 20 Flying Hours

Also Refresher Courses for Wartime Pilots and those who have had flight training at other schools.

**These courses include 400 hours of Ground School with Lectures, Laboratory and Shop Practice.*
†The Private Pilot's Course includes 200 hours of Ground School Training.

T. C. Ryan Flying School, Dept. W, Ryan Airport, San Diego, California. Please send me your illustrated catalog.

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UNUSUAL STRENGTH

Kelsey-Hayes Aircraft Wheels are built with a factor of safety well in excess of anything that could possibly be required.

But with this exceptional strength —weight, an important factor— has been kept to the minimum.

Designed by men who know the rigid demands of Aircraft service, Kelsey-Hayes Aircraft Wheels have been universally approved as standard equipment in the industry.

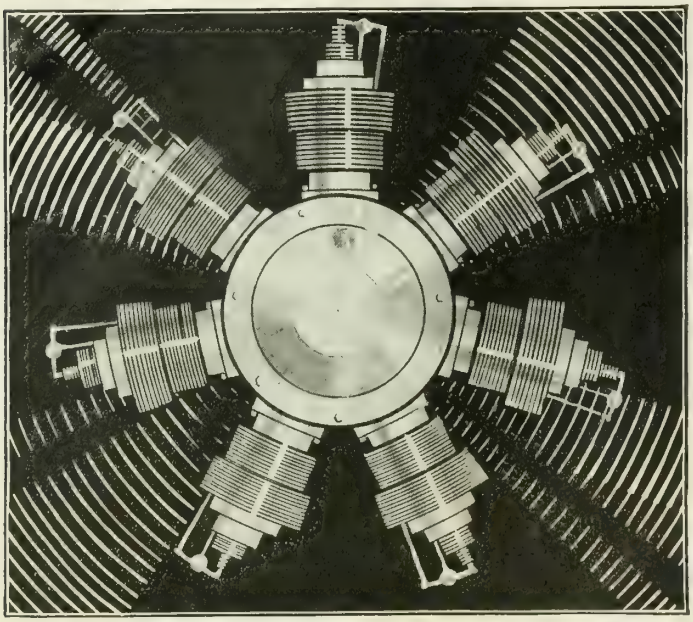
Obtainable in sizes ranging from 14″ x 3″ tail wheels, to 36″x 8″ side wheels. Write for further information.

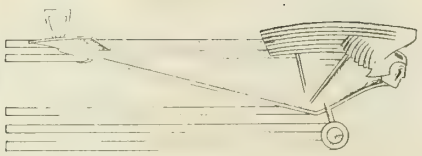
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Aircraft Division

KELSEY-HAYES WHEEL CORP.
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KELSEY HAYES
AIRPLANE WHEELS





First of all, the AIRPLANE ENGINE must lift itself . . .

Next to reliability, the weight of an airplane engine is all-important. An airplane engine literally lifts itself by its boot straps—excess weight in the engine means less pay-load in the plane.

Get rid of surplus dead-weight by using the light, strong Alloys of Alcoa Aluminum. Weighing about 1/3 as much as iron or steel, some of these Alloys, when heat treated, attain the strength of structural steel—55,000 pounds per square inch *minimum*. These aluminum alloys are highly resistant to corrosion.

When you design a part for an airplane engine keep these two statements in mind; when a metal part is built to a specified *strength* it can be made *lighter* with Alcoa Aluminum Alloys; when a part is to be built to a specified *weight* it can be made *stronger* with Alcoa Aluminum Alloys.

Our nearest office will gladly send a competent representative to give you full information on the application of Alcoa Aluminum Alloys to aircraft engines. Address today ALUMINUM COMPANY of AMERICA; 2484 Oliver Building, PITTSBURGH, PA.



ALCOA

ALCOA ALUMINUM

THE ONE METAL THAT FLIES BEST

THE WORLD'S BEEN WAITING NOW HERE IT IS



THE NEW . . . . AMERICAN EAGLET

$995

F.A.W. or F.O.B. Kansas City

(a slight extra charge for crating)

Introducing America's first conventional type airplane to sell for less than $1,000.00 . . the American Eaglet.

This is the airplane which will make America airplane-minded. It will take the altitude out of the high cost of flying. The cost of operation is less than $1.00 an hour.

Rugged, snappy of appearance and possessing marvelous performance characteristics, the American Eaglet is the foremost ship on the market today for sport or student training flying.

It is the first featherweight airplane to be presented with air wheel landing gear equipment. Your landing gear worries never begin with the American Eaglet.

ABOUT THE AMERICAN EAGLET (Cleone Powered)

Takeoff.....25 to 50 feet
Landing Speed.....15 m.p.h.
Climb.....350 ft. per min.
Air Speed.....60 m.p.h.
Cruising radius.....175 miles
Gliding ratio.....12 to 1

Color Scheme:
Chrome Yellow Wings with Green Fuselage.

Fuel Tankage:
Five gallons of fuel, eight parts gas to one of oil carried in a single tank.

Weights:
Gross weight.....580 pounds
Engine weight.....46 pounds

Dimensions:
Length over all.....21 ft., 6 in.
Span.....34 ft., 4 in.
Height.....78 inches
Surface area total..164.4 sq. ft.

The twenty-five horsepower Cleone engine, a two cylinder, two cycle power plant weighing forty-six pounds, has taken the ship to 8180 feet in 64 minutes.

The American Eaglet lands and takes off virtually in its own length; it has an air speed of approximately 60 miles an hour, and its gliding ratio is 12 to 1.

The American Eaglet in a remarkably short span of time will be the world's fastest selling airplane.

Dealers in aircraft and those interested in selling this plane should wire for our proposition immediately.

AMERICAN EAGLE
AIRCRAFT CORPORATION
FAIRFAX AIRPORT KANSAS CITY, KANS.

"MASTER OF THE SKIES"

AMERICAN EAGLET ORDER BLANK
13 Fairfax Airport Kansas City, Kansas

I hereby place my order for.....American Eaglet (s) and enclose deposit for same in the sum of $..... (at rate of $200 per plane) this order to be filed and filled in rotation according to the date of receipt at factory.

Number

Name .....

Address .....
(Street) (City) (State)

It is understood that if I become an American Eagle Distributor or Dealer I may have a sales franchise covering the American Eaglet.

FREE!



a Phillips Flight Calculator



to every Transport Pilot

YOU'VE bucked headwinds, cussed crosswinds, smiled at tailwinds; you've chased chickens and pestered planets; you've razzed Podunk and high-hatted Squeegee; your tack has been bouncing from 500 to 2000; your speed indicator has been acting like a Blue Monday stock market—your map says 310 miles—your Big Ben says you've been up two hours and thirty minutes—

All of which means higher mathematics until you pull your PHILLIPS Aviation Flight Calculator from its pouch—set the 2 hr. 30 min. hair on the 310 miles hair and—presto!

"Not bad for the old crate", you exclaim, "averaging 124 miles per hour—this PHILLIPS '77' Aviation Gasoline takes a load off the motor and another load off my mind—Happy Days!!—I see a PHILLIPS sign on that port. Here's where papa makes another happy landing to Phill-up with more PHILLIPS '77'."

MAIL COUPON

Nose 'er down, fill out the blank, mail it in and pronto we'll send your Phillips Flight Calculator. No obligation—there's one for you whether or not you are "hep" to PHILLIPS "77". While you are filling out the blank—pilots who enjoy peace of mind are refueling with PHILLIPS "77".

Phillips Petroleum Company

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PHILLIPS PETROLEUM COMPANY
Bartlesville, Oklahoma.
Without obligation send me my Phillips Flight Calculator.

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Address. . . . . .

**Transport License Number*. . . . . .

Employed by. . . . . .

Type ships and engines. . . . . .

What Phillips Products have you used?. . . . . .

*Important—Transport License Number must be given.

BUILD *Public Confidence* *with* ARMCO *Perforated Iron* PIPE





The Ashland (Wisconsin) municipal airport has sod runways drained with Armco Perforated Iron Pipe, thus postponing the need for expensive runways while enjoying an excellent landing surface.

TODAY'S public is looking at aviation through the small end of the telescope. Defects look big. Uninterrupted operation of planes into and out of airports in all seasons is a psychological remedy for the insistent skepticism. In whatever way you are connected with the industry, you owe it this support:

Encourage, promote, aid or participate in the installation of drains for flying fields. The field or fields in which you are directly or indirectly interested must be made safe for takeoffs and landings in any weather. The healthy development of flying demands it!

Fine buildings and strikingly handsome equipment are a mockery to the pilot who knows there is a dangerous mudhole down the field.

Already, several prominent American airports are equipped with drainage systems of Armco Perforated Iron Pipe. New Orleans, Buffalo, Rochester, and others chose this strong, flexible, pure iron product because it is warranted by Nature tests since 1906 to give many years of uninterrupted, trouble-free service under the runways . . . keep them dry and firm, always fit. Just below the surface, it is unaffected by rollers, trucks or landing planes. Armco Corrugated Iron Pipe holds the unequalled record of 24-years service under the railroads and the highways of the nation to date.

Armco Perforated Iron Pipe is doing an increasingly important part in the stabilizing of aviation. Join the program for safety and public confidence. New data on drainage as applied to flying fields, gathered through the field studies and investigations of Armco engineers, will be sent on request. Use the coupon.

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand

ARMCO CULVERT MANUFACTURERS ASSOCIATION
Middletown, Ohio

ARMCO CULVERT MANUFACTURERS ASSOCIATION, *Middletown, Ohio*

Send complete data on airport drainage.

*Name*_____ *Address*_____

*Title*_____ *With*_____ *Airport or Co.*

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"We get $5 a ride . . . take in an average of $75 per hour with our EASTMAN *Flying Yacht*"



"THE Eastman Flying Yacht has opened up for us an entirely new field for taxi and charter work. People ride in this trim seaplane whom we would never be able to attract with a landplane. We can bring it directly to where people with money congregate. Thus we find that we can keep the Eastman busy three to six hours a day on passenger-hopping alone at resorts having less than 4000 population . . . We get $5 a ride and we take in an average of $75 per hour."

This quotation from a letter from Associated Aircraft, Chicago, Ill., offers conclusive proof that the Eastman Flying Yacht is a big money-maker. Operators near lakes or sea-side have an opportunity to cash in on this new passenger-hopping business!

The Eastman powered by a 170 H.P. engine lists at only $9985. Its two spacious cockpits accommodate three passengers and pilot in comfort—a generous payload capacity. Operating costs are low—approximately $15 per hour including overhead and all expenses. A net profit from commercial operation of $1000 per week can be easily made with an Eastman!



Write today for an illustrated catalog and complete information on the Eastman Flying Yacht—learn more about the profit possibilities it offers. Our dealer plan will interest operators who want to secure additional profits from airplane sales.

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RYAN AIRCRAFT CORPORATION
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"WHAT DO YOU MEAN, DRAIN IT? . . . THAT'S QUAKER STATE!"

When ordinary oil has taken the count, Quaker State is still hale, hearty and ready for more pummeling...ready and able to give that sweeter, smoother lubrication a motor needs.

And why can Quaker State "take it" longer than ordinary oils and then come back for more? Because there's an extra quart in every gallon of it.

Quaker State is not refined like ordinary oils. It is *super-refined*. This Quaker State *super-refining* process carries it a step further and removes the quart of waste material that ordinary refining leaves in every gallon of oil.

In place of this quart of waste you get a quart of the finest lubricant—four full quarts of lubricant to every gallon of Quaker State. So you really get an *extra* quart.

And there's another reason why Quaker State Aero Oil is a better oil for any plane. It is made from 100% pure Pennsylvania Grade Crude Oil—the very finest crude oil the world produces.

Get Quaker State Aero Oil at your airport—and you'll get the finest oil that ever ambled aloft. You'll get an oil that holds its body—an oil that stands up under engine heat like no other oil you've seen. You'll get the smoothest, sweetest lubrication a motor ever had!

Other Pure Pennsylvania Products are:

QUAKER STATE MEDIUM MOTOR OIL

QUAKER STATE MEDIUM HEAVY MOTOR OIL

QUAKER STATE HEAVY MOTOR OIL

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QUAKER STATE TRACTOR OILS



QUAKER STATE OIL REFINING CO., OIL CITY, PA.

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AERO OIL

Get that extra quart in every gallon

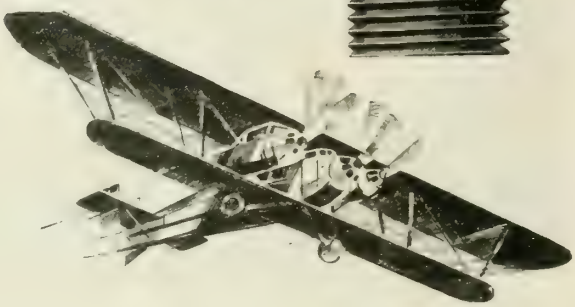
Greater Safety

Better Performance

with this

New Spark Plug





CHAMPION'S Aero A is the first great basic advance in spark plug design to meet the specific needs of aircraft engines.

It is winning for itself the same immediate, world-wide recognition for better performance and greater dependability that Champion everywhere proudly enjoys on land and water.

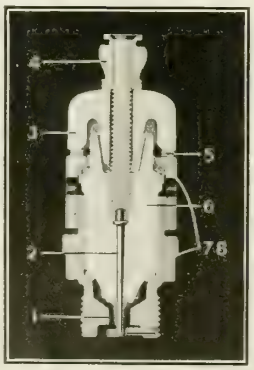
This Aero A is, literally, revolutionizing the performance of aircraft engines.

Built to give a new and much greater factor of safety under the stringent requirements which aviation imposes on spark plugs, pre-ignition and fouling are virtually impossible.

Sillimanite, the finest known insulator and an exclusive Champion material, is particularly adapted to aircraft spark plugs because of its remarkable strength, and its vastly superior resistance to heat and cold. Moreover, the Aero A's unique design *positively prevents interference with engine operation* in the remote event of insulator breakage.

Install Aero A spark plugs in your plane. They will convince you why they have met with such instant recognition and successful use by transport lines, mail lines, racing flyers and private owners, alike. They will give you *more* hours of dependable service, and better performance, because they are the better aviation spark plugs.

• • •



Champion Aero A Exclusive Features

1. Restricted bore. 2. Special analysis electrode. 3. Secondary sillimanite dome insulator. 4. Welded steel terminal. 5. Copper seal. 6. Primary sillimanite insulator. 7-8. Molded copper gasket seals.

Concentration on this one type spark plug for practically all aircraft engines enables Champion, through large production, to offer this vastly superior spark plug at the extremely low price of $1.25.

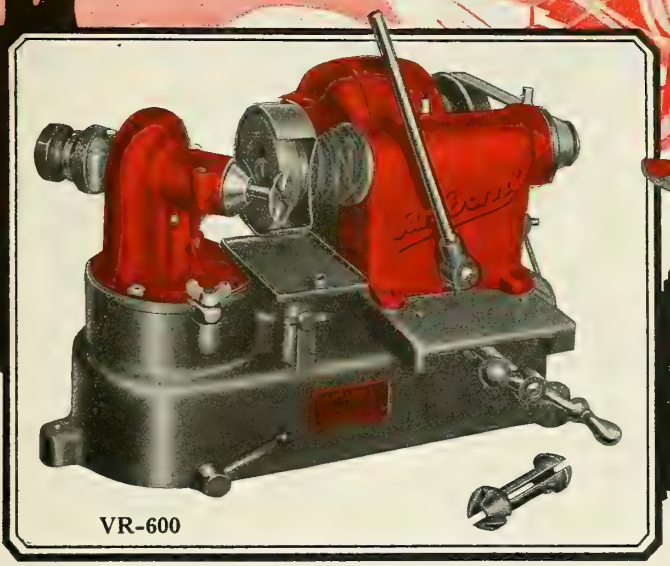
Champion

SPARK PLUGS *for aviation*

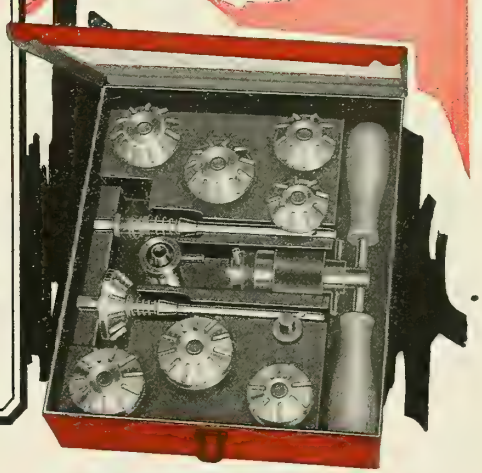
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PREVENT VALVE TROUBLE IN THE AIR

Valve failure is frequently the result of misalignment between the seat and guide. Valve reconditioning with the Van Dorn Self-Centering Aircraft Pilots and the Van Dorn Aircraft Valve Refacer produces a precision job, insuring better and safer engine performance.



VR-600



VAN DORN AIRCRAFT VALVE REFACER

Capacity 1/4" to 11/16" valve stem diameters.

A precision grinding machine for refacing valves true to their stems. In addition it will accurately sharpen valve seat cutters, grind rocker arms, etc.

Valves are chucked accurately with twin grip collets which are suitable for aircraft valves with short stems.

VR-600 . . . . . $157.00

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Contain all the necessary equipment for recutting Airplane Engine Valve Seats rapidly and accurately.

UNIVERSAL AIRCRAFT VALVE RESEATING SET
Will service practically all makes of engines.
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WRIGHT VALVE RESEATING SET
for Wright J-5, J-6 and R-1750 Engines
No. 57.....$68.00

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The Van Dorn Electric Tool Company, Towson, Maryland

For every flying hour

ANYWHERE *you go!*



For every flying reason

STEARMAN

PASSENGER and mail operators on split-minute schedules, aviating sportsmen on their own . . . relax comfortably in the knowledge that wherever their flying takes them they are always at home with a Stearman. Spotted at points all over the broad land, east to west, north to south, they find Stearman facilities, Stearman equipment, Stearman alertness to serve them—Stearman co-operation. 300 H. P. and 400 H. P. Junior Speedmail; 225 H. P. Business Speedster. . . . Write, wire or telephone.



STEARMAN AIRCRAFT COMPANY, WICHITA, KANSAS
Division of United Aircraft and Transport Corporation

"FINE MATERIAL"



Increased pay now rewards PARKS *graduates*

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BY DIRECT WIRE FROM

WESTERN UNION

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A2 40 NL=TCS BURBANK CALIF JUN 18

PARKS AIR COLLEGE=

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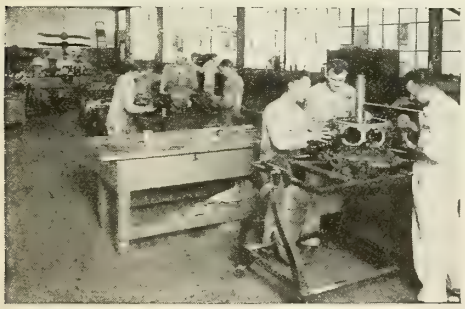
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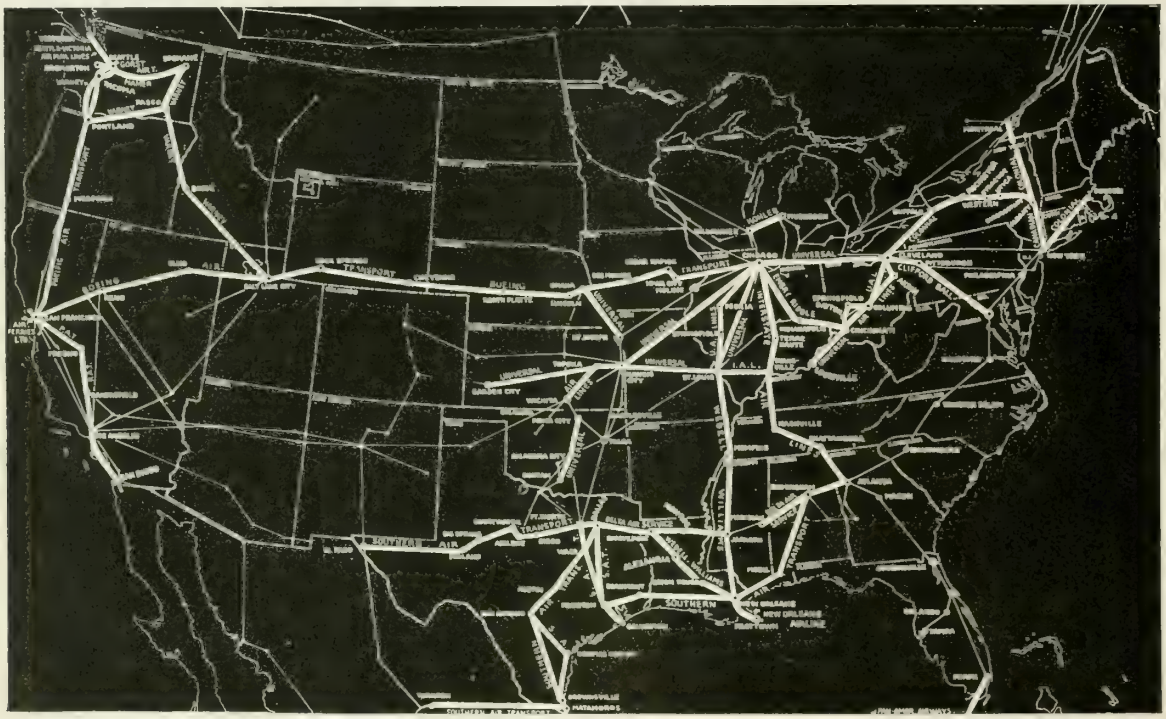
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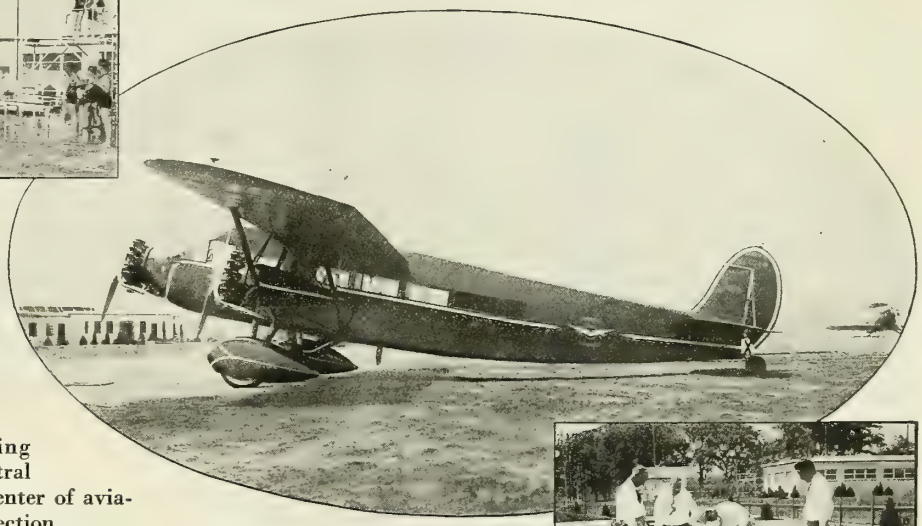
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AD-8-Gray

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...But swimming, golf and tennis also bring thousands to CENTRAL AIRPORT







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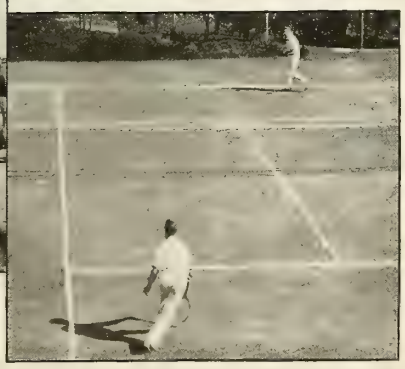
Now, it is also being made a great recreation center. To attract new thousands of potential customers for transport and sight-seeing services. To promote wider patronage for the manufacturers and selling and servicing agencies located here! To provide additional incentive to owners of private planes to make this their headquarters!

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Here is the most accessible metropolitan airport in the world. City Hall, Philadelphia, is but 15 minutes away by car or bus; the center of Camden is within 6 minutes. In the Philadelphia-Camden area are 3,000,000 people, thousands of trained mechanics, and hundreds of factories producing materials essential to the aviation industry.

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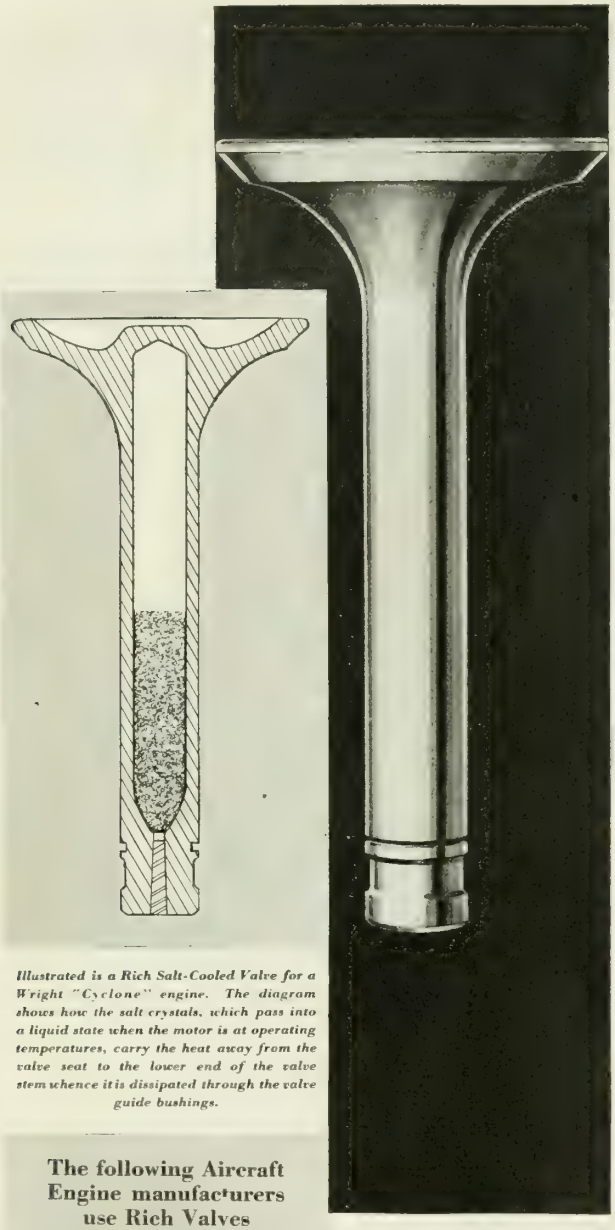




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Five main highways converge here: The White Horse Pike to Atlantic City; Marlton Pike to Lakehurst and Spring Lake; New Jersey State Highway to New York; Kaighn Avenue to center of Camden; Crescent Boulevard to Philadelphia.



Illustrated is a Rich Salt-Cooled Valve for a Wright "Cyclone" engine. The diagram shows how the salt crystals, which pass into a liquid state when the motor is at operating temperatures, carry the heat away from the valve seat to the lower end of the valve stem whence it is dissipated through the valve guide bushings.

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Kirkham Aeroplane & Motors Corp.
Le Blond Aircraft Engine Corp.
Lycoming Mfg. Co.
Michigan Aero Engine Corp.
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Ford branches will be glad to give you information on the Ford tri-motored, all-metal plane in all models.

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A Ford all-metal, tri-motored Army plane flew 1140 miles over land and sea from Miami to France Field, Panama Canal Zone, in 11 hours and 20 minutes, with a crew of four. In this record flight it passed through two rain squalls and dodged another. The official report said: "Plane and engines functioned perfectly, so the flight was made without particular incident."

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Most notable of all is the record of Stout Air Lines which have completed 1,000,000 miles of safe flight, carrying 107,000 passengers.

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The Ford Plane

AUGUST, 1930

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AERO DIGEST

THE MAGAZINE OF THE AIR

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Cover Design: Curtiss Kingbird in Flight over Curtiss Airport at Valley Stream, Long Island, N. Y.



A Ford trimotor of the Scenic Airways flying over Canyon Lake on the Apache Trail, one of the most beautiful air trips in the Southwest

A SURVEY OF CIVIL AVIATION IN THE SOUTHWEST—Part 1: Air Transport Operations

By George Svehla

IN the vast territory on the North American continent known as the Southwest, broad developments in commercial aviation are proceeding at so rapid a pace that they cannot fully be appreciated by the air-minded of the crowded East.

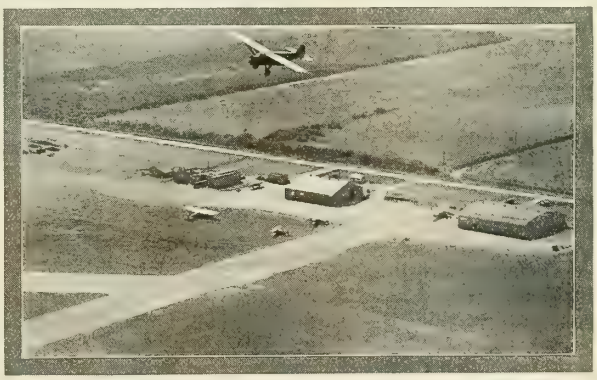
In the four states comprising the Southwest, which for our purposes are Arizona, New Mexico, Oklahoma, and Texas, are growing metropolises—distributing, manufacturing, financial—separated by extensive stretches of prairie and desert.

This area (which in reality goes beyond the international border and continues on south into Mexico) comprises nineteen per cent of the total area of the United States. Texas, for example, could contain six Ohios and have plenty of space to spare.

Vast as this area is, it contains but eight per cent of the country's population, but lest we be mistaken as to the character of these people, and picture them merely as ranchers and miners employing the antiquated modes of travel which history has ascribed to them, let us remember that there are in the Southwest 212 airports already established and ninety-six more proposed. The existing airports are fifteen per cent of the national total of proposed airports. These air-fields employ seven per cent of the nation's licensed pilots, and six per cent of the mechanics, two-thirds of whom are located in Texas. In this area are eight per cent. of the licensed planes, with an average of 1.18 pilots per plane, and an average of .96 mechanics per plane.

The urban centers which one finds located at intervals throughout this region, in 1927, manufactured products with a total value of $1,716,105,000; and the banking institutions, which represented ten and a quarter per cent of the national total, held resources (in 1928) of $2,305,000,000.

In these 571,000 square miles of territory all kinds of topographical and meteorological conditions prevail. From eastern Texas and Oklahoma with wide areas of low and swamp land, the country gradually shifts to a higher level and fertile agricultural plain. Cotton, fruits and vegetables are raised extensively in some regions. Nature has blessed certain localities with mineral wealth, especially petroleum and natural gas. Local manufacturing and distributing centers have developed at advantageous and strategic locations. Then there are many miles of grazing lands, and after that the desert. In the valleys of the desert one sees many oases, spots of beauty and fertility fed by mammoth irrigation projects. Then the mountains, with the mines which extricate hidden wealth, and then again the desert with its isolated oases and finally, as one leaves the historic Southwest, he rises up to top the Sierras beyond which lies California.



Aerial view of the international airport at Brownsville, Texas, showing an S.A.T. plane in flight and a P.A.A. ship on the field

The Southwest boasts of having one of the first flying fields in the country. The sunny all-year flying climate of San Antonio induced the Army to establish there first one field and then another well back in the barnstorming days of the aviation industry. State fairs and other gatherings in the Southwest were treated to the thrills of the barnstorming performances as was the country over. When the pioneers tired of this circus life and others returned from the World War, many decided that the Southwest was a great place to center their aviation activities.

Air traffic can be divided into two classes: (1) transporting mail, express, freight and rendering various other services and (2) carrying passengers. Today the Southwest is literally honeycombed with airlines crossing in all directions, connecting all cities and towns of any importance, and furnishing almost the entire area with air mail service, air express service, fire patrols, air taxi service, crop dusting service, aerial surveys, and other services where time is an essential element. The many well-developed airlines in Oklahoma and northeastern Texas provide much better service than is provided in any other part of the country.

An interesting feature of all this is that not only do the separate companies compete as would be expected, but they also coöperate by providing good connections with other air and rail lines. Moreover, several of them are making money. The recent financial reports of Western Air Express and National Air Transport surprised many people who believed air transport companies were merely a big gamble.

Tulsa has become the busiest airport in the world, surpassing all records set at Croydon, Le Bourget, Amsterdam and Berlin. Why? Low rates, safe and speedy equipment, good schedules, air-minded business men and corporations, and an enthusiastic public seems to be the answer found throughout the Southwest territory.

The aviation situation here can perhaps best be described by detailing the activities of the various organizations separately, describing their growth, operations, equipment and financial set-up; and by a survey of the more important airports, schools, flight services, and activities of corporations whose principal business lies outside of aviation.

Southern Air Transport, Inc.

The company known as Southern Air Transport, the largest operating entirely in the Southwest, is a subsidiary of the Aviation Corporation through the operating organization known as American Airways, Inc. Since the organization and activities of this system were described in considerable detail in the December 1929 issue of AERO DIGEST, I shall confine this discussion to a brief history of the devel-



Panair Ford at Brownsville before taking off for Mexico City

opment of the company with its various units and subsidiaries.

The original S. A. T. system grew from a small company owning but seven airplanes, and operating two air mail routes as its only source of revenue, into an organization which now operates more than a hundred planes throughout the entire South and engages in all phases of aviation except manufacture.

The system as it stands today represents a coördination of various Aviation Corporation airlines which heretofore operated under various names; it is the outgrowth of the former Southern Air Transport, Braniff Airlines, Central Airlines and Gulf Coast Airways. Nevertheless, I shall describe the organization of the various units which operated in the Southwest before they lost their individual identity.

The greatest growth of this company followed the purchase of Texas Air Transport, Inc., by Mr. A. P. Barrett in October 1928. Texas Air Transport, Inc., now one of the several units of the early S.A.T. system, employed twenty men at that time.

Until Barrett bought control, Texas Air Transport had grown but little since it began operations February 6, 1928. Tom Hardin, chief pilot, supervised the two air mail lines from an office on the third floor of the administration building at the Fort Worth Airport. One of the two air mail lines ran from Dallas through Fort Worth, Waco and Houston, to Galveston. The other line connected Dallas through Fort Worth, Waco, Austin and San Antonio to Laredo. These lines carried the air mail which connected at Dallas with National Air Transport, which holds the air mail contracts for the New York-Chicago-Dallas route.

Hardin had also organized the T.A.T. Flying Schools, and started the school at Fort Worth with three students. Texas Air Transport had originally tried to conduct a school by using air mail pilots for instructors on their off days, but this plan did not succeed.

The pilots flew over unlighted airways and through fog or rain when discretion advised remaining on the ground, determined to prove to a skeptical public the practicality of air mail. And the poundage began to climb steadily.

Aside from the consistent delivery of the mail, a number of other factors entered into the increase in poundage. Lighting of airways and improvement in equipment, both contributing to the maintenance of excellent service, and the decrease in the cost of postage from ten cents to five, greatly augmented patronage of the air mail. Another factor was the continued effort of the traffic department to "educate the public" to the use of the air mail for social correspondonce and business.

Texas Air Transport and Gulf Coast Airways, another unit of the early S.A.T. system, carried air express as well as mail, though in Texas this function was left largely to the S.A.T. passenger lines.

With the additional capital which Barrett brought to Texas Air Transport, the new school grew rapidly and others were established successively at Dallas, San Antonio, Houston, New Orleans, Atlanta and Amarillo. There were about 200 pupils enrolled at these seven schools when Southern Air Transport abandoned this phase of aviation activity to concentrate more on commercial flying. The schools will presumably be resumed by the Universal Aviation Schools division of the Aviation Corporation.

This first venture into aviation encouraged Barrett to branch out into other phases of the industry. He organized the Texas Aeromotive Service, Inc., putting Pete



Fokker trimotor of Standard Airlines (now W. A. E.)

Taylor, a former mechanic of Dallas, in charge as general manager.

The Texas Aeromotive Service was designed to service airplanes and airplane engines of Texas Air Transport, Inc., and other companies and individuals through an establishment of service stations over the state. When the possibilities became evident, however, plans were changed so as to include the entire South, and the network of service stations extending from El Paso to Atlanta was renamed Southern Aeromotive Service, Inc.

Barrett has also organized the Southwest Insurance Agency to handle the insurance of airplanes, the T.A.T. Broadcast Company operating radio station KSAT which began operations October 1, 1929, and established the present system of passenger air transport lines known as the S.A.T. Flying Service, Incorporated.



Passengers boarding an S.A.T. Fokker Universal at Fort Worth

Mr. Robert J. Smith, who was formerly aviation secretary of the Dallas Chamber of Commerce, became general traffic manager, and the first passenger line began service on March 9, 1929. This line extends from Brownsville through Corpus Christi to San Antonio. On March 30, 1929, the line from Fort Worth

through Dallas to Houston and from Dallas through Fort Worth, Waco, Austin to San Antonio was started. Mr. Smith went along as general traffic manager of the Aviation Corporation when Hardin went to New York to become operations manager of the controlling system.

The Airports Engineering and Construction Company was later organized, and is now headed by B. A. Slater as chief engineer. This division of the S.A.T. system was organized to select sites and build airports for the system, but is now doing similar work for various municipalities and others.

The sales organization of Southern Air Transport as it now stands is composed of a general sales manager, an assistant sales manager, divisional managers, regular salesmen who work under the divisional managers, sub-dealers covering parts of the country in which no regular division points have been established and individual owners of aircraft who sell on a commission basis.

Accessories are marketed through the servicing department of each division and at all service stations.

A very new organization in the ranks of the S.A.T. system is Southwestern Aerial Surveys, which is doing aerial surveying and mapping for the Federal Government,



Curtiss Falcon mail plane flying the N.A.T. route to Dallas

and can, of course, be employed by civilians and organizations in need of such a service.

The S.A.T. system now operates more than 100 planes in contrast to the seven operated a little over two years ago, and employs approximately 300 persons as compared to twenty at that time. The company is erecting a fourteen-story skyscraper in Fort Worth to be known as the Aviation Building, which will house the general offices of the organization. The studio of KSAT will be on its top floor.

Behind all this activity has been the personality of a far-sighted man, who, of course, is A. P. Barrett. Born in Tennessee, Barrett tried his hand at several enterprises before he achieved his present status. Having once represented a county as a state solon, he decided his field was politics, and subsequently ran for Congress. His defeat was fortunate for the aviation industry, because it caused him to change his mind about a career.

A few years later he drifted to Fort Worth, and the capital he had was soon separated from him after a



Refueling a T.A.T. ship at Winslow on the transcontinental line



Western Air Express Fokker flown on Los Angeles-Kansas City line

venture into oil. In debt, he went to New York, where he heard that a Texas public utility, the Ranger Gas Company, was to be sold at auction. Hurrying over, he discovered he was the only prospective bidder. Although he had no money, he convinced the seller he could scare up enough to complete the purchase. Taking a train to Ranger, he collected enough of the company's accounts to pay the purchase price.

Later he acquired other utilities which he built up into the Texas-Louisiana Power Company, owning properties throughout Louisiana, Oklahoma, Kentucky, New Mexico and Texas. He then sold a controlling interest in the organization to the General Water Works and Electric Corporation of New York, a widespread utility operating organization.

In July of 1928 he entered the field of transportation with the purchase of three bus lines which he merged into a single system. In October of the same year he bought Texas Air Transport, Inc., and expanded it into the system which has been described, the S.A.T. system. Shortly after the organization of the passenger lines, a major interest in Southern Air Transport was sold to the Aviation Corporation. Barrett became a vice president of the Aviation Corporation following the merger.

Braniff Airlines, Inc.

Braniff Airlines, Inc., formerly was a part of Universal Aviation Corporation, which is also a subsidiary of the Aviation Corporation. Braniff Airlines was, therefore, an associate company of S.A.T., although all operations were carried on separately before its recent incorporation into the Southern Air Transport system.

The company was organized June 20, 1928, as Paul R. Braniff, Inc., and in April 1929 merged with the Universal Aviation Corporation. A new company, called Braniff Airlines, Inc., and controlled by Universal, was formed.

A new hangar of steel and concrete, measuring 132 feet by 141 feet and containing an office building, was completed in Tulsa the first of November 1929. The structure cost approximately $70,000.

At the time it and Central Airlines were added to S.A.T., the Braniff line operated five Fairchild 71's, four Hamilton Metalplanes with Hornet engines, one Ford trimotor (Wasp engines), two Travel Airs with Wright Whirlwind engines, and one Stinson-Detroiter with Whirlwind engine.

Operations are carried on from the municipal airports at Tulsa, Oklahoma City, Wichita Falls, Fort Worth and Dallas, connecting with S.A.T. at the latter cities. Taxi business is also handled, as well as sightseeing "hops,"

(*Continued on page* 58)

CYZING UP THE GNUS

By

by Caldwell

GNUSPAPER advertisements disclose that the human race suffers from a distressing variety of ills. Four out of five of us have pyorrhea, and the other one needs yeast. Nine out of ten have halitosis and the whole ten have Morning Mouth. Many, alas, are held back in their social careers by B O—Body Odor. Internally, it appears, we are practically gone already, mere empty shells. We need mineral oil to lubricate the fast-rusting works; we require milk of magnesia to polish the lining of the stomach; and every so often the failing mechanism demands a shot of salts to jolt it temporarily into even a semblance of life.

In short, we're a mess. That's about what it amounts to. Our glands are underdeveloped or not functioning. We're short of vitamins, calories, and money. And if we don't reach for a cigarette instead of a hot dog, we inevitably must grow so fat that we'll stick in revolving doors.

But it is when we scan the gnuspaper for word of the air clan the ills of humanity become most apparent and amazing. To the ordinary advertising-column afflictions under which all of us groan, the airman of the notoriety-and-publicity-seeking variety adds ailments peculiarly his own. Not satisfied with halitosis, B O, dingy film, pyorrhea, social backwardness, and an inability to converse fluently in French, the limelight-loving aviator cultivates several mental derangements that the rest of humanity and of the air clan, happily, seldom falls heir to.

He, it appears from the gnus, must take unto himself an assortment of dementias that cause him to disport himself in a manner somewhat resembling the antics of a Mexican jumping bean. Fortunately, he forms a very small section of the flying fraternity. Unfortunately, however, while he is the small and useless part of aviation, he yet is the vociferous part—that part we hear of in the gnus. He bears the same relation to useful and sensible aviation that the cackle does to the hen. You don't get any good out of the nut aviator or the hen's cackle.

One of the favorite stunts in cackle aviation today seems to be the outside loop. Members in good standing of the Cuckoo Club are competing amiably among themselves to win the coveted world's record for number of outside loops successfully completed. At this writing some pilot whose name I can't recall holds the title of Chief Cuckoo with forty-six, ten more than another pilot holding the title of Assistant Chief Cuckoo, who is heartbroken in consequence; I suppose this latter bird will go after the record again and strain every nerve and a couple of spars to regain the title of Chief.

THERE has been much argument pro and con—mostly con—on the advantages and disadvantages of all sorts of stunt flying. I always have maintained that all forms of stunting, whether done casually by individuals or by stunt teams at air meets, are bad advertising for aviation. At their best, they merely call attention to the airplane as a species of circus attraction, and *not* as a vehicle of transportation. At their worst, they result in the death of the stunter and bad publicity for all forms of aviation.

It has been argued that stunting makes a better pilot. Better for what? What stunt helps an air mail pilot to fly a load of mail from New York to Cleveland? What stunt helps a pilot to do anything but get his name in the gnuspapers? And this does not mean that a student should not be taught to put his plane into a spin in order to learn how to get it out. Every pilot should know what positions his airplane might get into in the air, and what to do to get it out again. But that does not mean that he should spin down to fifty feet, or flutter down upside down in order to demonstrate that at a hundred feet he can turn over and land—to the admiration of the crowd.

I have heard it said that flying is a sport and that real aerial sportsmen simply love to go up and stunt for the thrill it gives them. Well, to those who think and say that, I want to present this observation of mine and I request that they consider it very carefully.

I have been flying for over fifteen years and have been watching airplanes and pilots for twenty-two years. In all that time I have *never* seen an airplane being stunted *where it could not be observed by a large number of people.* I have spent much time in the country, I have seen thousands of airplanes in the air, and never *once* over unsettled districts have I seen an airplane stunting. And who ever has? Did anyone over see an airplane pause in its progress over the Pennsylvania hills to do stunts? Did anyone ever see a pilot take off from an airport, fly miles into the country where nobody but a few scattered farmers could observe him, and then do stunts? If anyone ever saw that, it was a student *learning* to stunt so he could return and thrill his friends.

My observations of pilots have led me inevitably to the conclusion that stunting is performed, not for the thrills it affords the stunter, but for the admiration of his prowess that he hopes it awakens in the mind of the beholder.

I AWAIT amusedly the abuse that will be poured on my head by the species of pilot whose toes I have tramped on above. Meanwhile I stare intently into the Crystal Gazing Device for Blind-Flying invented by the Great Behncke, in private life David Lewis Behncke, Third District Governor of the National Air Pilots' Association. Peering into the Great Behncke's Crystal Gazing Device, I look two years ahead and see that all useless stunting performed for publicity purposes will be banned by the Department of Commerce.

Mind you, I don't *know* that it's going to be banned. In fact, I don't think even the Department of Commerce knows that it is going to ban stunting. But the Crystal Gazing Device informs me that it is.

If Pullman cars looped, rolled, spun, traveled upside-down, and otherwise disported themselves as devices in an amusement park, I do not believe that they would have instilled in the traveling public the confidence they have built up and earned. It is useless to argue that the public, watching the asinine antics of an admiration-craving pilot, will differentiate his maniac maneuverings from the peaceful progression of the passenger-carrying plane. After all, he's in an airplane, and so would the spectators be if they had cared to leave the ground. So, at least, they consider; and so they take a train.

BUT perhaps I don't get quite all of this from the Great Behncke's Crystal. I also try to read the writing on the wall, as the Biblical prophet of old did when he

(*Continued on page* 154)

SOME NOTES ON GLIDER FLYING

R. S. Bee
President, Alexander Glider Club

THE whole nation has become glider-minded, with the result that glider clubs are being organized throughout the country. With correct supervision and guidance, these clubs will do much to increase the safety of flying and create a better understanding of aviation. Glider flying, if it is to grow and become one of America's sports, must have proper guidance. Without it, enthusiasm for gliding will rise as a wave and then die.

The several established aircraft companies which have recently started to produce gliders can do much to assist the buyers of their products in receiving proper instruction as to their use. By studying the experience of some of the pioneer glider clubs and information circulated by the National Glider Association, and by incorporating this knowledge in their designs and passing it on as instructions to the purchasers of their product, these manufacturers can furnish a real stimulus to the sport.

After it is organized, a club first has to consider what glider to buy (provided it plans to buy instead of build one). It is important that the club get a good glider, one that meets the conditions under which it is to be used. Some of the factors to be considered when deciding on a glider are:



Taking off in a glider by means of the shock-cord launching method

(a) *Structural Strength.* A light frail glider will not stand up under rough treatment or abuse, of which it will receive an ample amount in the hands of beginners. There is no sport—because little actual flying—if the glider is in the shop for repairs most of the time. Moreover, if such were the case, the members would soon lose interest and, more than likely, the group would soon disintegrate.

(b) *Design and Construction.* The glider should be quite stable and have large control surfaces. The rudder bar should be strong enough to withstand the strain of a tail-high landing, when the glider comes to a sudden stop and throws all the weight, including that of the pilot, forward on it. The bottom skid ought to be at least three-quarters of an inch thick and three inches wide; it ought to be easily replaceable; and it ought to be round along the bottom edge so that it will slip over the ground in a side landing. The tail assembly should be removable for transportation. The safety belt should be strong and wide enough to hold the pilot in his seat in a bad landing.

(c) *Topography and Elevation Where Glider Is to Be Used.* In the high mountainous country of the West, about thirty square feet more of wing surface is needed.

There are two principal methods of glider flying: launching off a slope with a rubberized rope (shock cord) and auto towing. Although it is not practical where the terrain is consistently flat, where there are hills the launching method is safer and less apt to result in damage to the craft. Furthermore, the launching method is much more sport and less likely to be abused than auto towing.

The Launching Method

With the launching method, flights should be made from a hill with gentle slopes in at least three directions, in order to take advantage of almost any prevailing wind. In discussing the launching method, I shall review the training program that the Alexander club has developed.

Many clubs impose on themselves a definite handicap by beginning actual flying before their members have had sufficient ground training. Without an adequate understanding of the theory of flight and glider construction, the neophite pilot may make bad flights and damage the glider, with a resultant damage to the club treasury. Before one starts gliding, it is desirable to read some book on the theory of flight, such as "Modern Flying", "Applied Flight", or some other text along that line.

If the student makes a hop off the ground in his first day of practice, he is progressing fast enough—and the glider will last much longer. It would be ridiculous for anyone to attempt to take off and land an airplane the first time he got in one; yet that is the method used by new glider clubs. Before attempting a flight, the beginner should be seated in the glider and given instructions on how to use the controls. The glider should then be balanced on a piece of wood or a rock so that it can be rocked and turned in any direction, simulating various attitudes of the craft in flight, in order that the student may learn to make corrections with the controls. The student should not be allowed to fly until his control has become smooth and natural. The average novice cannot acquire that feeling in one day. When he thinks he is ready to try a real take-off, it is a good idea to study and practice one more day.

When finally the student is prepared to try a flight, the glider should be placed on the slope and—what is very important—below the crest of the slope. The reason for placing it there is that, if it were launched from the top, the student would have to nose down when he reached the slope or he might be caught in an up-draft at the edge of the hill and stall. If he starts parallel to the slope, however, he already has the angle at which he is to fly and can easily keep close to the ground.

After getting the glider in position to take off, the student should seat himself on the machine and fasten the safety belt. (He must remember to keep his feet on the rudder bar until he comes to a full stop; a foot under the skid may mean an injured leg.) The shock cord is next put in the hook on the glider. Someone must hold the tail rope. At this time only two men are on the ends of the shock cord, one on each end. Both ends of the cord should not be stretched out together in front of the glider, because the cord may come out of the hook and fly forward, hitting those holding it. It is better to pull the two ends out at an angle, so that if the shock cord slips is will come harmlessly (*Continued on page* 148)

NAVIGATION ON THE NON-STOP FLIGHT FROM NEW YORK to BERMUDA and RETURN

By Lieut. H. P. McLean Connor, U.S.N.R.

Navigator of the Roger Q. Williams Bermuda Flight

FOUR years ago it occurred to me that there were unusual possibilities for applying practical navigation to aircraft in order to increase safety and insure a knowledge of one's position while en route over the ocean. With this thought in mind, I conducted experiments while serving on ocean vessels at sea and made flights for short distances over the ocean whenever opportunity presented itself. After three years of such experimenting, I was convinced that scientific navigation could be applied to aircraft in a practical way. Last November, I left the ship on which I was serving, to endeavor to bring about a practical demonstration of my theories on the subject.



Lieut. Connor demonstrating method of taking observation with bubble octant

At that time I was fortunate enough to become associated with Roger Q. Williams, a prominent flier of long experience, who has the patience and the knowledge to prepare for the success of his flights in a most careful and scientific manner. We discussed the possibilities of a flight to Bermuda, which was suggested to me by Frank A. Tichenor, publisher of AERO DIGEST. Our original plan was to fly to Bermuda one day, spend a day on the island and return the third day. We aimed to bring out the fact that this beautiful coral island, a paradise for vacationists all the year 'round, can become really a close neighbor when reached by air. Two days of travel each way are required by steamer, but we knew that to fly from New York to Bermuda would take less than eight hours of daylight travel. When we considered the problem of landing on the island, however, we concluded that a suitable place for landing and taking off does not exist there at the present time.

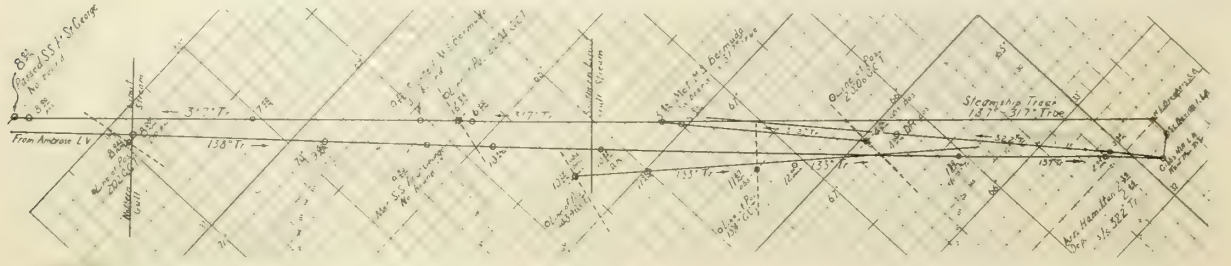
Therefore, we eventually decided upon a non-stop return flight as the best means of establishing the feasibility of tourist travel to Bermuda by air, which is relatively certain to be undertaken commercially in the near future. There is, of course, much to be learned of flight conditions and navigational methods for such an over-water air route before regular service can be considered seriously. We hoped our pioneering in this direction would show the correctness of our navigational methods, for to pick up this small landmark 780 statute miles away would mean the employment of precise calculations not necessary in flights where the objective is a larger target.

We were unable to carry out our actual preparations until a few months ago, and we finally got off to a start on Sunday, June 29. Weather conditions over the ocean on that day were as nearly perfect as possible for our project. We were told that we could expect overcast weather with showers around Bermuda in the early afternoon. With this datum, which was furnished by Dr. Kimball, meteorologist of the New York Weather Bureau, we were ready to shove off.

Our ship, the Bellanca *Columbia*, was loaded with 333 gallons of Richfield gas and twelve gallons of Richlube oil. Its total weight, including the weight of Williams, Erroll Boyd, co-pilot, and myself, was 4,768 pounds. This ship is powered with a Wright J-5 220-horsepower engine which had never given Roger trouble at any time. It is the same engine which powered the *Columbia* on its New York to Germany flight.

The *Columbia* has a small compartment in the rear of the main tank arranged for the navigator. An observation hatch is cut overhead and fitted with a removable windshield to permit the taking of observations. Without the aid of this windshield, it would be impossible to hold a sextant steady against the force of the airstream. For a chart table I used a ply board, two feet by three feet, which fitted conveniently on top of the main tank in the aft end of the ship and which made an excellent portable chart table.

Our navigational instruments consisted of a Pioneer Brandis type octant with a bubble attachment, which enables the navigator to take observations when the sea horizon is not clearly visible, used for measuring the altitude of any celestial object; one Longines Aero-chronometer (Weems patent) and three hack watches. Where precision in celestial navigation is required, it is essential that chronometers and watches be accurate to the split



Part of aircraft chart showing the course plotted during the Roger Williams non-stop flight from New York to Bermuda and return

second. We carried one nautical almanac and nautical tables, and one copy of Dreisonstok tables for quick calculations. We also had an aircraft plotting sheet, published by the United States Hydrographic Office, which is specially divided into ten-mile squares for quick determination of latitude and longitude, a celluloid aircraft plotter, parallel rulers and dividers.

We also carried six Coston calcium water lights for checking our drift angle.

The usual engine instruments are installed in the *Columbia*. We had three Pioneer compasses, an earth inductor compass with dial, a magnetic compass on the cowling and a magnetic compass in the cabin. These compasses were carefully checked up for deviation by Glen Garrett of Pioneer and myself, and at no time were they out of order.

The flying instruments consisted of a rate-of-climb indicator, turn-and-bank indicator, air speed meter, Daiber slow bubble for lateral control, Sperry artificial horizon, thermometer and tachometer.

The earth inductor dial and Sperry artificial horizon were separated with a special rubber mounting to absorb vibrations.

The lighting system consisted of two separate units: two dash lights arranged on the dashboard with a rheostat control and two special flashlights for emergency, also used for energizing the phosphorous material on the dials of the instruments.

The J-5 Wright Whirlwind engine was equipped with the latest type of AC Miko spark plugs.

The crankcase breathers on the motor were extended by a rubber hose through the cowling to permit gases to escape into the air, thereby keeping fresh air in the cabin. The air vent on the large tank was extended from the roof of the cabin to prevent fumes from accumulating and causing airsickness.

As an aid to night flying, and to prevent the exhaust gases from distracting the pilot while flying blind, the exhaust manifolds of the top cylinders were shaped in such a manner as to bring the exhaust flames below the pilot's line of vision.

The right rudder pedal was equipped with a series of elastic cords of variable tensile strength, thereby permitting the pilot to fly "hands and feet off" with ease. As a full measure of safety, a special drain for the carburetor strainer was installed in the cockpit, permitting the pilot to drain the strainer while in flight.



The Bellanca ready to take off on the Bermuda flight. In the oval: Lieut. Connor, Roger Q. Williams and Erroll Boyd

On the cross-country test flights made by Williams and me, we discovered an accurate way to set our compass courses and fly them, arriving at our destination within the short period of thirty seconds of the estimated time. This method, we believe, puts aerial navigation on a par with nautical navigation for accuracy and dependability.

The success or failure of any venture depends almost entirely on careful and minute preparation. These preparations include careful selection of crew and plane, supervised by experienced mechanics and ground crew. Our mechanics, Shorty Wilder and Ted Sorensen, had worked tirelessly in preparing the *Columbia* for its journey, realizing that so much depended upon the skill and care with which the ground work was conducted.

We planned to start from Roosevelt Field at 2:00 a. m. so that we could obtain good stellar observations at morning twilight, when well out over the ocean on our course to Bermuda. Because of the condition of the field and the light variable winds, however, we were unable to get off until about 5:00 a.m.

The speed of the engine upon being warmed up on the ground was 1,600 r.p.m., with an oil temperature of forty degrees Centigrade.

At 5:01 a.m. Roger gave her the gun, and we slowly started down the 3,800-foot runway. The take-off was in a cross wind; and after running nearly the entire length of the runway, in twenty-four seconds, our ship lifted and slowly attained an altitude of 200 feet. The oil temperature was forty-eight degrees Centigrade, and the engine was turning a maximum of 1,850 r.p.m. The barometer at the take-off was 30.14 inches.

We set our course for Ambrose Light Vessel which we passed over at 5:17 a.m. Roger throttled her back to 1,640 r.p.m. in order to economize on fuel. Graduated on each side of the stablizer were drift angle lines for every five degrees up to thirty degrees, permitting our taking accurate drift sights. As we passed over Ambrose Light, we set our course to steer 138 degrees true, which we estimated would take us to Gibbs Hill Lighthouse in Hamilton Harbor, Bermuda, a total distance of 657 nautical miles, or 755.56 statute miles from Ambrose Light Vessel. With an east northeast wind, force three to four, we were making eleven degrees drift to the right. The weather was fine, with a hazy horizon.

After we had been flying about one hour, the wind gradually became northwest with light breezes. We were averaging eighty knots an hour and obtaining our position by observations of the sun. With the change of wind, naturally we had to make an allowance for drift, and we were making our course good.

At 6:00 a.m. we calculated that at about 9:25 a.m. we should pick up on the track the S. S. *Fort St. George,* which was northbound. About 8:00 a.m. we passed over the northern limit of the Gulf Stream, which was in latitude thirty-seven degrees fifty minutes north, longitude seventy degrees fifty-three minutes west. There was no noticeable change in the air except for a slight bumpiness at times. The temperature of the air was eighty-three degrees. A formation of false cirrus and strato-cumulus clouds was in our path and visibility was about twenty miles.

Exactly to the minute shown by our calculation, 9:25 a.m., we sighted the *Fort St. George,* and ten minutes later circled her. The vessel saluted us with three blasts of her siren, and we returned this salute by three dips of our port wing.

We circled the *Fort St. George* twice, and then headed directly over her fore-and-aft line. By this method we checked our compasses on the vessel's heading, and as we left her astern, I obtained another "drift sight," from

which we found we were making eight degrees drift to the right. During this time Roger turned the controls over to Boyd and took photographs of the steamship; the photograph he took is shown at the bottom of this column.

As we passed the *Fort St. George,* we sighted the motor ship *Bermuda,* southbound, ten miles to port, or to the left of our course, and abeam of us.

By this time the wind had again become east, force three to four, and with an average engine r.p.m. of 1,600 to 1,625, we were averaging seventy-one knots per hour. The air speed indicator registered ninety to ninety-one statute miles. The weather continued fine, with some cumulus clouds in our track. Erroll Boyd was at the controls; Roger was making notes; and I was busy with the navigation, continually checking our course by "dead reckoning" and observation of the sun.

At 10:39 a.m. (14:39 Greenwich Civil Time) a line-of-position by the sun showed us to be twelve miles to the right of our course. Upon calculating our position and verifying it, I changed the course to 133 degrees true (five degrees to the left) in order to bring us on our track. The fact that we had gotten off our course twelve miles in such a short space of time, even with careful dead reckoning, indicated the necessity for obtaining accurate observations. Subsequent observations obtained by the bubble octant showed us to be making this course good. We continued on this 133-degree true course until 1:00 p.m., when we were on our original track line, and then hauled the *Columbia* down to 137 degrees true, the course to take us to Hamilton Harbor.

By this time the wind had veered from east to southerly and south southwest, force three to four. This shift naturally reduced our speed, which was now an average of only about sixty-eight knots. The sky became cloudy and overcast. The horizon was hazy. Cloud formations were cumulus and cumulus-nimbus, with some flying scud. We were then flying at an altitude of 400 feet, from which elevation the visibility was about ten miles.

As we approached the island about 2:00 p.m., the visibility became less and the ceiling lower. The sky was overcast, and we were unable to obtain observations, but the fact that we had successfully intercepted the *Fort St. George* on her track, together with the fact that Roger had sent me back a note informing me that we had passed some refuse floating on the water, indicated that we were on our course. Thick nimbus clouds were ahead of us, and we commenced to encounter light rain squalls, the wind backing to southerly, force four to six, which was just as Dr. Kimball had predicted before the take-off. By 2:10 p.m. the visibility was less than two miles.

At 2:23 p.m., Roger and Boyd sighted the radio towers at Hamilton Harbor. At 2:24 p.m. we arrived over the harbor in a heavy downpour, with a visibility of less than half a mile. We were then flying at altitudes of between fifty and 150 feet, and made a complete circle of the island. At 2:43 p.m. Roger dropped the mail sack at a residential section called Woodland, a suburb of Hamilton. We learned on our return that it was delivered safely to the postmaster without delay. The mail bag also contained a cablegram directed to AERO DIGEST, for Mr. Tichenor was keenly interested in our making a success of the flight. We learned on our return that he received our cable promptly.

In the twenty minutes that we circled the island, we completed our survey as to the possibility of using landplanes or seaplanes for a Bermuda service. Since it appeared inadvisable to delay in the area of heavy squalls, at 2:44 we headed homeward. The rain squall we encountered was most unexpected and unusual; it must have been as disconcerting to the island natives as it was to us.

On commencing our homeward bound trip, Roger stepped the engine up to 1,675 r.p.m., and with the aid of favorable winds, we were averaging ninety-five knots ground speed, or between 108 and 110 miles per hour ground speed.

We set our course to steer 322 degrees true from Gibbs Hill Lighthouse in order to intercept the *Bermuda,* which was southbound. By 3:00 p.m. we had run out of the rainy weather. We continued on this course until 4:06 p.m. (20:06 Greenwich Civil Time), when celestial observation showed us to be slightly to the left of our course. About 4:30 p.m. we passed over the southern limit of the Gulf Stream, and as in the morning, there was no appreciable change in the air. The wind was east southeast, force three to four, and we were al-

·NAVIGATION LOG

·NEW YORK [ROOSEVELT FIELD]·TO·BERMUDA [HAMILTON HARBOR]·NON-STOP·

LOG KEPT ON 60TH MERIDIAN TIME·

Sunday 29th June 1930
Navigator Lt H P Connor U.S.N.R.

Mean Variation 11° West
Deviation [Earth Inductor 5° East / Vert Mag 15° East]

HOUR	LATITUDE NORTH	LONGITUDE WEST	COURSE TRUE	COURSE/DRIFT	WIND DIR	WIND MPH	DRIFT	AIR SPEED STATUTE	AIR SPEED KNOTS	TEMPERATURE AIR °F	TEMPERATURE OIL °F	VISIBILITY MILES	ALTITUDE FEET	R.P.M.	REMARKS / WEATHER CONDITIONS / CLOUD FORMATION / ETC
5 P.M.	Ambrose Light Vessel		138°	135°	123°	ENE 3-4	- 11°	91	77	69 73°	46 52°	20	200	1640	4 P.M. Weather on 38th Part of 322° Course Was Fine 5 P.M. Observations Ambrose Light Vessel Visibility 10 Miles 135° Mag Variation 11° West Deviation 5° East
6 P.M.	39° 46	73° 00'	138°	135 143°	125° 135°	ENE 3-4 Smooth	- 11° - 1	88	80	74 73°	66 67°	15	250	1600	Cumulus Formation Visibility Good Cloud Ceiling Clouds Forming Higher
7 P.M.	38° 49	71° 54	138°	149 145°	136 137°	Calm 0 NW 1-2	0° +1°	90	82	76°	69°	20	350	1625	Cumulus Formation Visibility Continue Fine & Clear
8 P.M.	37° 50	70° 55	138°	143° 147°	137° 139°	NNW 1-2	+5°	88	82	85°	72°	20	500	1600	8 P.M. Over Middle Light Of Group Ambrose Are Almost Dead Ahead 9 P.M. Fair Cloudy Visibility Continue
9 P.M.	36° 49	69° 46	138°	136°	150°	E/E 2	-6°	90	74	85°	72°	20	1000	1625	Cloud Formation Fine Clear 9 P.M. Passed Port A Gibbs Ahead 9 P.M. Mag // Fort // Gibbs Ahead Course
10 P.M.	35° 55	68° 47'	138°	136°	128°	Calm 0-1	-8°	91	71	82°	72°	20	800	1660	Encountered Cumulus Formation Visibility Decided To Reduce Altitude & Begin To Go Down - Cloud Ceiling Low
11 P.M.	34° 56	68° 00	Changed Course 155	136 156	128° 128°	ESE 4 Increasing	-8° -3°	90	70 73	85°	72°	20	600	1625	11 P.M. Changed Course To 155 Mag. To Pass Between Channel Entrance And Coral Reef Ahead. Passed Over Light Of Gibbs Hill Lighthouse
12 M.	34° 13	67° 05	155	159 160°	153 152°	Calm 0 SE 1-2	0° +1°	90	74 75	85°	73°	15	420	1625	Cloudy Fix On Island - Hazy Indistinct Formations Cumulus Formation
1 P.M.	33° 25'	66° 03	Changed Course 137°	147°	139°	SSW 2-3 SSW 3-4	+4° +4°	90	69 68	84°	73°	10	500	1625	1 P.M. Changed Course To 137 Mag. Visibility Continue - Cloudy & Part Open Sky - Indistinct In Patches Haze
2 P.M.	32° 35	65° 10'	137°	149°	141°	SSE 3-4	+6°	88	66	76° 76°	70° 68°	2° 1-2	200 100 50	1600	Low Ceiling & Poor Visibility - Passed Somerset - 2 P.M. Visited Dead Ahead

Running Time [Ambrose Light Vessel To Gibbs Hill Light House] 7 Hours 03 Minutes
Average Ground Speed - 92.2 Knots Per Hour
Average Ground Speed - 93 Miles Per Hour
Average Fuel Consumption 12 Gallons Per Hour (South Bound
Engine Throttled Down For Fuel Economy On South Bound Trip
Total Fuel Received 333 Gallons 1930 Lbs - Total Useful Load 2660 Lbs
Total Lube Oil Received 12 Gallons - Total Weight At Take Off 4760 Lbs

4 P.M. Ambrose Northeast Reserve Mean Dead Ahead
Cruised Inland Of Bermuda 7 P.M. Passed Port Side Ground 7:30 Observations Normal Visibility North Bound Distance [Ambrose Light Vessel To Gibbs Light House] 657 Nautical Miles - 755 Sq. Statute Miles

(Signed) Harry P Connor
Navigator

·BERMUDA [HAMILTON HARBOR]·TO·NEW YORK [VALLEY STREAM, L.I.] NON-STOP·

·LOG KEPT ON 60TH MERIDIAN TIME·

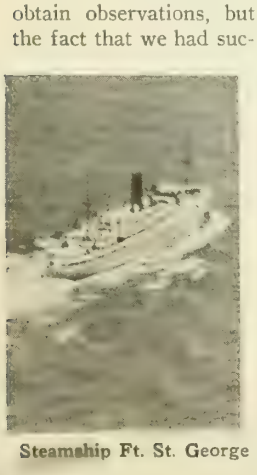
Mean Variation 11° West
Deviation [Earth Inductor 5° East / Vert Mag 2° West]

HOUR	LATITUDE NORTH	LONGITUDE WEST	COURSE TRUE	COURSE/DRIFT	WIND DIR	WIND MPH	DRIFT	AIR SPEED STATUTE	AIR SPEED KNOTS	TEMPERATURE AIR °F	TEMPERATURE OIL °F	VISIBILITY MILES	ALTITUDE FEET	R.P.M.	REMARKS / WEATHER CONDITIONS / CLOUD FORMATION / ETC
3 P.M.	32° 35	65° 07	Via Comm. 322°	323	330°	SSW 3-4 SSW 4	-5°	95	95	80°	71°	1-2 2-3	50 200	1650	2 P.M. Departed HAMILTON Set Course 322° True 323° Mag Assumed Compass Position Normal Low Ceiling Compass Normal
4 P.M.	33° 30	66° 17	322°	326°	333°	SSW 3 Sly-1	-5° 0°	91	93	84°	73°	10°	500 400	1675	Cumulus Formation 4 P.M. Passed Open Gulf Stream Clouds & Haze Fine
5 P.M.	35° 02	67° 30	322° 332 Per Compass	331° 334°	336° Allowed For Drift 341° 336° 2-3		+3° +6°	98	95	83°	73°	15°	400	1675	Passing Ambrose Channel Visibility And Ceiling Unlimited Overcast 5 P.M. Passed N.J. Bermuda Ahead
6 P.M.	36° 09	68° 44	311° 312°	330° 329°	337° 336°	ENE 3-4	+7° +6°	100	90 93	82°	73°	20°	400	1675	5 P.M. Circled Vessel 310 Miles Out Of Bermuda South Bound Exchanged Courtesy Cruised Course 311° True 330° Per Standard Compass
7 P.M.	37° 16	70° 03	312°	328° 327°	335° ENE 3-4 336° ENE 3		+5° +4°	101	96	78°	72°	20°	500	1675	Cloudy Fine Compass 7 P.M. Port Clouds & Fine Course & Clear
8 P.M.	38° 27	71° 25	311°	326° 323°	335° ENE 3 330° SE 2		-3° 0°	101	95	74°	71°	30°	2000	1675	Cumulus 8 P.M. Passed // Fort // Georges North Bound 8 P.M. Passed // Fort // Gloucester Exchanged Courtesy Fine & Clear
9 P.M.	39° 37	72° 45	311°	323° 319°	330° SE 2 326° SSW 1-2		0° -4°	100	95	72°	70°	10°	2500	1675	Cumulus to 2500 Altitude At Right Approached Clouds Abruptly Horizon
10 P.M.	Ambrose Light Vessel 40° 27	73° 49	311°	317°	324°	SW 2-3	-6°	101	94	70°	68°	5° 1°	2500	1675	Cumulus Haze - 9 P.M. Passed Ambrose Light Vessel [End Of Sea Passage]

Running Time [Gibbs Hill Light House to Ambrose Light Vessel] 7 Hours 09 Minutes
Average Ground Speed - 90.06 Knots Per Hour
Average Ground Speed - 100.90 Miles Per Hour
Average Fuel Consumption 14 Gallons Per Hour North Bound
Total Flying Time - 17 Hours 02 Minutes
Time Circling Bermuda - 20 Minutes
Total Fuel Consumption For Round Trip - 213 Gallons
Total Fuel Received - 333 Gallons
Total Fuel Remaining On Hand - 120 Gallons

Ground Fog Setting In 9:15 P.M. Circled Observed Four Vessels To Distinguish Lights Proceeded To Valley Stream & Landed At 10:02 Barometer 30.15 In. Normal
Distance [Gibbs Hill Light House To Ambrose Light Vessel] 657 Nautical Miles - 755 Sq. Statute Miles

(Signed) Harry P Connor
[Navigator]



Steamship Ft. St. George

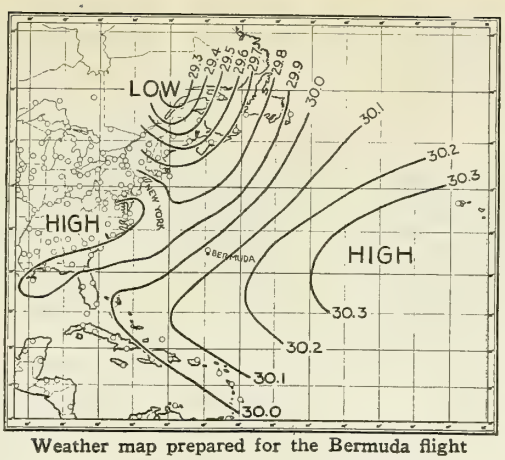
Log of the Bermuda flight and photographs made enroute



The Motorship Bermuda

lowing six to seven degrees for drift. The weather was fine and the sky was dotted with cirrus and cirro-cumulus clouds.

At 5:00 p.m. we sighted the *Bermuda* slightly on our starboard bow as we had expected, and at 5:06 circled her, making the usual exchange of courtesies and salutes. As with the *Fort St. George,* we headed directly over the fore-and-aft line of the *Bermuda* and obtained another check on our compasses. Since we were then on the regular direct line, we changed our course to 317 degrees true, which would bring us over Ambrose Light Vessel. Subsequent observations showed us to be making this course good, and accompanied by easterly and southeasterly winds, force three to four, we were stepping right along at ninety-five to ninety-six knots ground speed.



Weather map prepared for the Bermuda flight

We passed over the northern limit of the Gulf Stream about 7:30 p.m., and the temperature of the air gradually dropped from seventy-eight to seventy-four degrees. We were then flying at an altitude of 800 feet.

At 7:56 p.m. Boyd, who was at the stick at the time, sighted the *Fort St. George* dead ahead. He turned to me with a broad grin. At 8:05 p.m. we approached the *Fort St. George* from the south'ard, close to. This time we did not circle the vessel, because night was coming on and we were anxious to avoid as much blind flying as possible. We passed the vessel on her port side with her siren blowing three blasts in salute and Roger giving the *Columbia* three quick dips of our port wing in return. In each instance that we circled the vessels we flew alongside the boat deck and were able to see the passengers. We could see them enthusiastically waving and shouting to us as we roared past them.

The observations I obtained of the sun were calculated by line-of-position methods, and used in conjunction with "dead-reckoning" navigation, each position obtained being carefully verified, the accuracy of which was proved by our perfect landfall of the island in thick weather and interception of the steamers in track.

The sun set about 8:30 p.m., and with cumulus clouds around it, the horizon gradually melted. We climbed to 2,500 feet altitude as a safety precaution for flying blind.

As darkness approached, the Sperry artificial horizon, which we had installed, rendered us good service and aided us in blind flying. Used in connection with the Pioneer turn-and-bank indicator and earth inductor compass dial, this instrument is an invaluable aid to night flying over the ocean, for it indicates the plane's true attitude relative to the horizon and enables the pilot to maintain normal flight. [This instrument was described in the June issue of AERO DIGEST.—Editor.]

A low haze covered the sea, and at 9:40 p.m. we sighted Navesink Lighthouse off the Highlands. We could not discern Ambrose Light Vessel until we were right over it, when at 9:44 p.m. our sea passage ended and we made a bee-line for Roosevelt Field. The visibility was then less than five miles, and a ground fog was rolling in from the sea. We were able to discern the lights of Long Island in places, and at 9:55 arrived over Roosevelt Field at an altitude of a little more than 1,000 feet. Roger jazzed the motor as a signal for the airport attendants to turn on the floodlights. Because of the layer of clouds just below us that obscured the ground, we were unable to make out the lights which surrounded the rim of the 200-foot gas tank near the field. We decided, therefore, it was unwise to land here under these conditions, and headed for Valley Stream, where the floodlights were on because of night flying going on there at the time. At 10:03 p.m. Roger made a perfect landing, successfully ending our flight, which has been termed "non-stop from Roosevelt Field to Valley Stream, with a detour via Bermuda."

Summing up, our average speed southbound was 72.2 knots, or 83 miles per hour, and (*Continued on page* 182)


The island of Bermuda photographed by Roger Q. Williams on the non-stop New York—Bermuda—New York flight

BLIND FLYING AND RADIO (Part 2)

By

Herbert Hooner Jr

Chief Engineer, Western Air Express

IT was pointed out, in the first part of this article, that, for the purpose of analysis, the problems of navigation in blind flying can be grouped into three categories. The first was the collection of meteorological information and the placing of it in the hands of the pilot. The second was methods by which the pilot could readily determine his geographical position—that is, whether he was on the airway, or to the right or left of it; how far he had progressed along the airway, and his actual altitude above the ground. In other words, the determination of his location in space. The third problem was in relation to methods of determining his flying position—that is (a) the position of the wings with respect to the true horizon; (b) whether the plane was climbing or diving; and (c) whether the plane was holding its true course or was turning to one side or the other.

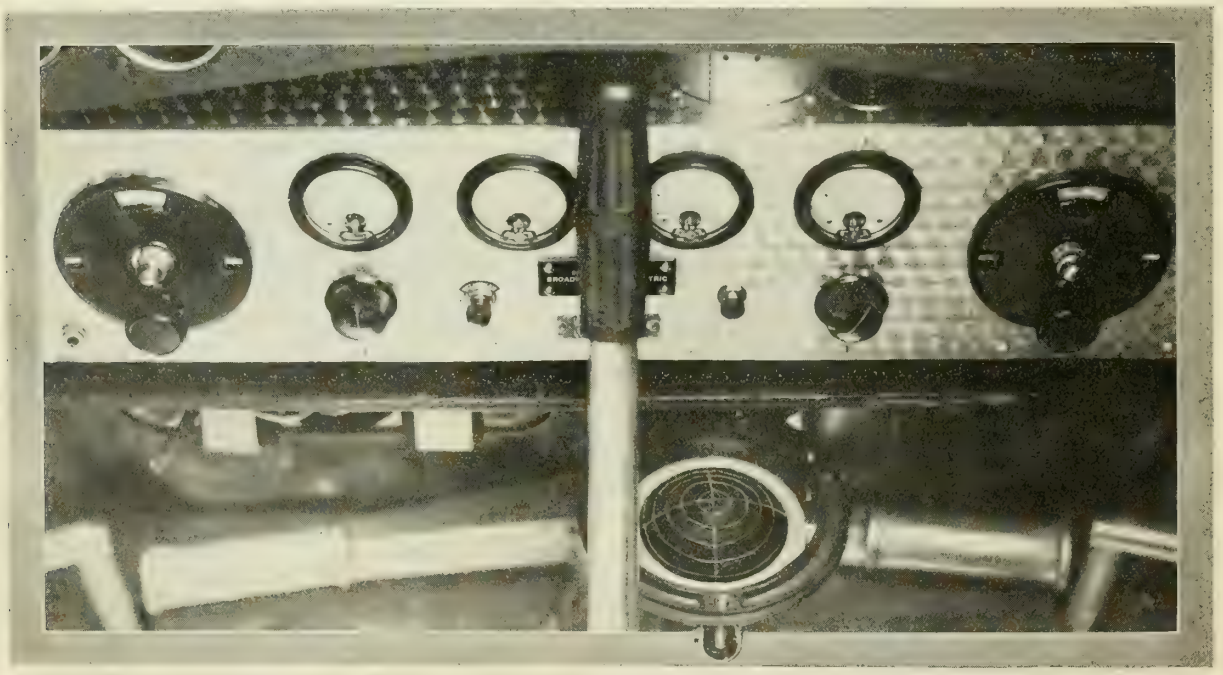
It is the purpose of this discussion to describe in a general way the methods and devices that are at present available to aid in blind flying, and to point out briefly the need of certain additional instruments or improvements on those which may be in use at present.

Of the three general problems outlined above, it is undoubtedly the third which is of major importance in blind flying, and yet, at the same time, it is the one that is the farthest from the solution.

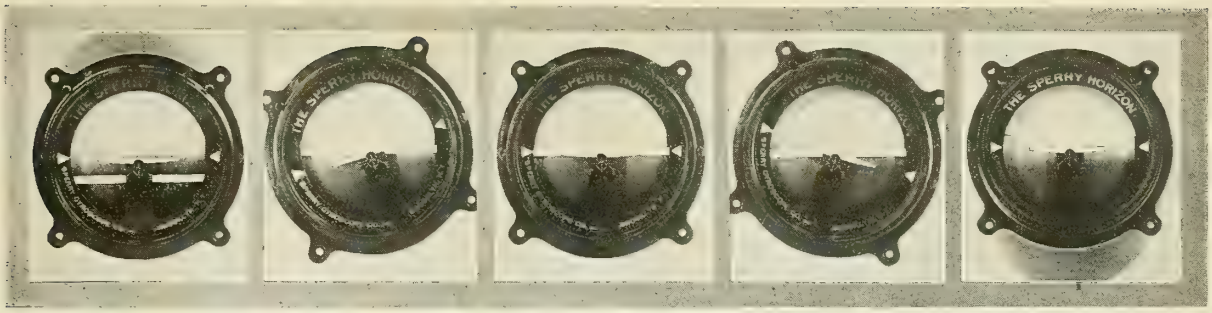
The gyropilot is certainly a decided advance in the direction of blind flying, and there is a good possibility that it may find wide application in air transport work. It may allow the human pilot to relinquish the controls, once that he has placed the ship on its course, so that he can concentrate on problems of meteorology and navigation. However, in take-offs, approaches and landings, the gyropilot will be of restricted use, although it has been found feasible to turn over the lateral (aileron) control to the gyropilot when taking off and landing. Instruments will be necessary to permit the human pilot to take control of the plane at any time with complete confidence.

Two general conditions exist in making use of instruments in the above manner. The first is in blind cross-country flight; the second is in blind take-offs or landings. In cross-country flying several instruments have been developed that give promise of being of great potential value. One of these is the artificial horizon. Through gyroscopic control a miniature airplane is made to hold a true horizontal position, and any movement of the real airplane away from its proper flying position becomes immediately apparent to the pilot. This will take care of horizontal and longitudinal stability. The final perfection of such an instrument is very desirable, because it will tend to reduce the number of instruments which must be watched simultaneously. In its present stage of development the artificial horizon can be depended on for about 100 hours of use, after which period the bearings on which the gyroscope is mounted usually require replacement.

The directional instability of a plane—that is, its tendency to turn off from a true compass course—has been corrected for in the past either by magnetic or earth inductor compasses, or else by the turn and bank indicator. All of these instruments have their disadvantages, however, and a considerable amount of research is in progress to develop some new method of indicating the true course of the plane. One means which gives some indication of

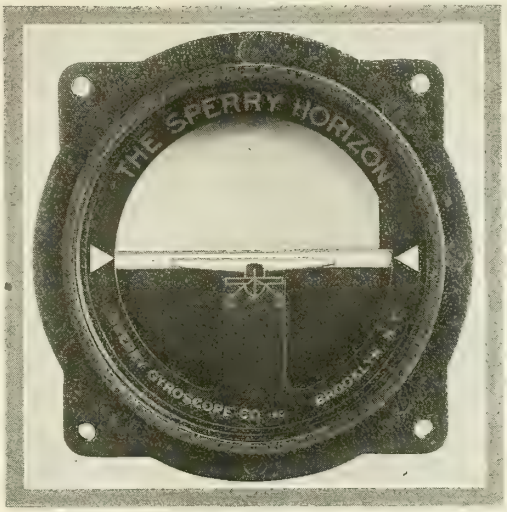


Combined radio-telegraph transmitter and receiver located below the instrument board of Art Goebel's "Yankee Doodle." The spinning top type of artificial horizon is located below it at the right of the control stick



Climbing Left Wing Low Level Flight Right Wing Low Diving

success is a radio direction finder. An indicator mounted on the instrument board shows whether the plane is heading directly towards a radio station, or to the right or left. This device is sufficiently sensitive to operate over distances of 150 miles or more, and its accuracy is such that a turn of one degree can easily be detected. Almost any radio station may be used as a guide, either a Department of Commerce radio beacon station (in which case the drift of the plane may be corrected for also) or a weather broadcasting station (the voice can be heard in the headphones simultaneously).



The Sperry artificial horizon

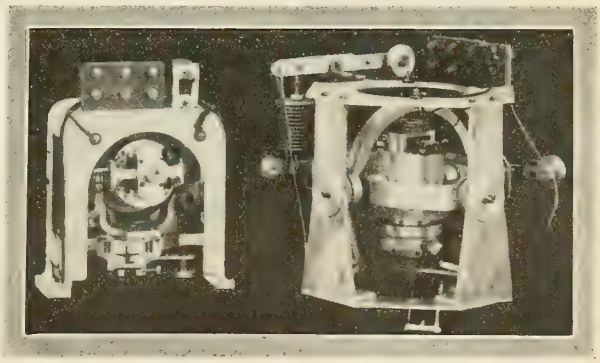
If this or some similar device is perfected, and used in conjunction with an artificial horizon, it will be possible for a plane to find its way from one airport to another under weather conditions that would preclude any flying at the present time. Such a flight, however, would require that the air ports of departure and destination be in areas of good visibility in order to allow for normal take-offs and landing. The instances in which such conditions could be counted upon definitely are not many, nor are there many pilots or transport operators who would sanction passenger operations under these conditions. It therefore appears that, before blind flying can be generally adopted, some reliable means of making blind landings will have to be developed.

Although there are a number of organizations that have been doing research work on blind landing devices, nothing has yet been produced that has generally been accepted as reliable. It is generally agreed that such devices can ultimately be expected, but it is still too early to say by what means or in what manner the final result will be accomplished. It is safe to say that it will be at least two years before blind landings become general practice. Most people familiar with the subject are inclined to think that it will be nearer five years before the transport companies will feel sufficiently confident to permit it in ordinary operation. Nevertheless, the art is progressing so rapidly in all directions that any sort of an estimate may be wrong.

To sum up the discussion thus far, there are many problems that must be solved before blind flying instruments and methods can be put to use, such as more reliable power plants, larger fields, better lighting facilities and more adequate weather reporting services. It is reasonable to expect that with experience and gradual development in the art of air transportation, these problems will be solved by the time that blind flying devices have been proved reliable.

The radio telephone has already removed one of the major handicaps to low visibility flying, by enabling pilots to obtain up-to-the-minute weather information. The radio marker beacon and the above-ground altimeter are still needed before the geographical position of a plane can be readily determined. The artificial horizon and the radio direction finder, or some other equivalent devices, are needed before changes in the flying position of a plane, resulting from horizontal, longitudinal and directional instability, can be corrected for. The gyropilot, though desirable, is not an absolute necessity, because the human pilot, with the aid of suitable instruments, should be able to take over the control of the plane at any time. Reliable blind landing and take-off methods, however, appear to present the most serious problems that must be solved before blind flying can generally be accepted as standard practice. The extensive experiments that are being undertaken by the Bureau of Standards, other research organization and the transport companies, all give much encouragement.

It seems certain, if air transportation is eventually to reach its fullest usefulness, that a considerable amount of low visibility flying will be necessary under adverse weather conditions. Although it may take a number of years of intensive research and pioneering work to bring it about, there apppears to be no fundamental reason why it cannot eventually be accomplished.



The two units of the Sperry gyro-pilot. At the left is the gyroscopic unit and at the right the servo-motor unit

LIGHT-HEARTED AND LIGHT-HEADED

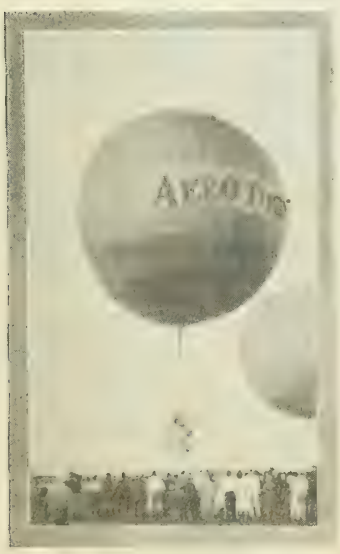
The Log of the Balloon Aero Digest

By Samuel Taylor Moore

As an expression of its interest in lighter-than-air development, AERO DIGEST *entered a bag in the National Elimination Balloon Race for the Litchfield Trophy which started this year from Houston, Texas, on July 4th. The co-pilots were Captain Samuel Taylor Moore, Air Corps Reserve, and First Lieutenant William C. Eareckson, U. S. Army Air Corps. The following log presents a graphic picture of balloon racing. The* AERO DIGEST *finished ninth. The pilots have no apology for their showing. However, it might be emphasized that of the fifteen balloons entered, six were light bags of single-ply fabric. The others, including the* AERO DIGEST, *which was made available through the coöperation of the Akron Business Club and the Goodyear Tire & Rubber Co., were of double-ply fabric. Because of the difference in the weight of the balloon envelopes, the single-ply balloons each had an advantage of 300 pounds-plus in ballast in the take-off. The fact is not stated as a protest. It represents an advance in design.*

HOUSTON, Texas, 6:20 p.m. July fourth—We are off—for God, for country and for AERO DIGEST, riding easily at 1,000 feet altitude. Eric is balancing himself on the edge of the basket straightening out the control ropes above our rain canopy. I am jotting down these notes while watching our instruments and piloting. The crowd is still lining the Bellaire race-track which we just left amid much confusion, farewells to friends, trying to meet the appeals of movie and still photographers, final instructions of the officials. The oval is still hemmed by automobiles. We were the fourth racing bag to take off—not counting the pilot balloon. It was rather a confused departure. The supply of hydrogen ran out and we were busy until the last minute trying to beg, borrow or steal enough cylinders for a full inflation. We were only partially successful. We were a trifle flabby when we reached the ascension point, which probably cost us a couple of bags of ballast on the take-off. Charlie Bausch of the Navy, operations officer, heaved us into the air after I told him we wanted to take off heavy and it cost us half a bag of ballast to check gravity pull. We'll see him later; the son-of-gun! We are traveling as light as possible, no radio equipment, only a barograph, altimeter, rate-of-climb indicator and compass. Four balloons are strung out ahead of us; the pilot bag; Tex Settle in *Navy Number One;* Hineman flying Cap Honeywell's yellow balloon, and *Army Number Three,* Lieutenant Buie. We have twenty-two bags of ballast on board and Eric suggests that we should have brought along glass beads instead of sand. His idea is that win, lose or draw, when we hit Oklahoma we can trade with the Indians and come out owning a flock of oil wells.

7:15 p.m.—For the last hour we have been traveling over a wooded country-side at 1,200 feet and at ten miles an hour. Houston is several miles to the east and south now. Her skyscrapers stick up from the business section like the hub on a wheel. It looks as though the schedule of take-off had gone to hell. It is an hour since we left and we can only see four balloons behind us, but that may be because they are riding below our horizon. One yellow bag has gone up to 3,000 feet and is drifting eastward over Houston. The pilot bag is down on the ground drag-roping. We are rapidly overtaking her. There's a thunderhead straight in our path, but it appears to be disintegrating as the sun goes down. We seem to be gaining slowly on the leaders. We've straightened out the basket and are regaling ourselves with a fried chicken sandwich and a tomato apiece. We've food and water enough to last three days.



We take off heavy, the fourth racing balloon to leave the ground

8:15 p.m.—It's getting dark now. The sun went down as red in the face as Dallas Welford and wearing a cloud for millinery that looked like one of Queen Mary's hats. Very intriguing sunset, gold, cerise and blue—like a Japanese screen in an apartment I know on Riverside Drive. The pilot balloon is way behind us now. We are putting out a riding light. Still at 1,200 feet, but our speed seems to be picking up. Twenty-one bags of ballast left. It looks like a nice long flight. Swamp country below. The whip-poorwills sing. Some lighting flashes to the west! Easy!

9:15 p.m.—We're now at equilibrium at 1,000 feet over Tamina, Texas. We can follow the course of automobiles by their headlights below. Fourth of July celebrations are under way. We've seen a dozen front-porch family fireworks displays, rockets, Roman candles and such. Hurray for the Fourth! The only noise now is the barking of dogs, or the howling of coyotes. Let's call them coyotes, here in Texas. A half-moon throws a ghostly light on the countryside below. We drift on at fifteen miles per hour.

10:15 p.m.—Lots of excitement! Ten minutes ago over Conroe, Texas, some hombre used us for a target! I had turned in for a cat-nap. Our basket is only four by five feet and I had curled myself around a couple of sandbags and had my legs sticking out over the side for comfort. And then this disciple of Billy the Kid opened fire. We must show up plain against the moon. Both Eric and I have been fired at often in balloons. It seems to be a sport for weak-minded people—but I never heard bullets whistle so close before. Seven of 'em sung right alongside, very uncomfortable. We're quite indignant over it, for Eric and I are agreed that no Outraged Fathers or Affronted Husbands have any right to shoot *us* up—leastwise in Texas. The truth is that I put as many sandbags as possible between myself and those bullets, but Eric, being impulsive and revengeful, unlimbered our own pistol and kept his head out over the side looking for a chance to return some lead. He couldn't locate the flashes. We're down to 900 feet now, making fifteen miles an hour. We just spoke to Hineman in his bag. He heard the reports of the gun, but didn't hear the bullets sing. I'm going back to try and sleep.

11:15 p.m.—We are still at 900 feet traveling due north over Trinity River. The breeze has freshened and we are making between twenty and twenty-five miles. I'm still reclining and enjoying a lullaby from the croaking of frogs

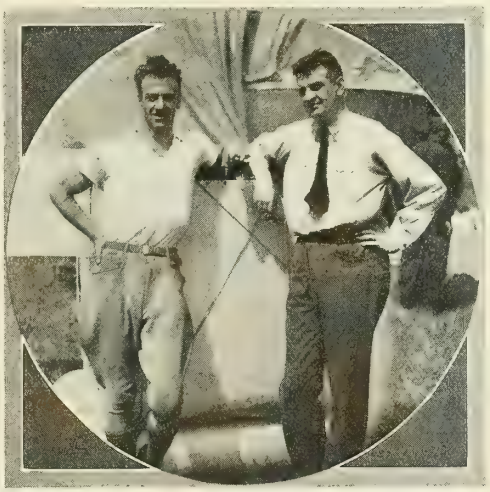
and the love songs of Trinity River turtles. They ought to sing under water.

12:15 a.m., July 5—Revivified by a chew of cut-plug, I'm on the bridge once more while Eric is trying to find a soft spot among the sandbags. We're at 1,200 feet, west of Crockett, and making twenty miles plus. The moon is bathing the countryside and the eerie call of hoot-owls brings peace to the soul. I can even forgive Two-Gun Pete back at Conroe now. He probably had been celebrating the Fourth on Panther's Milk. Lights flash here and there from other balloons, but they are too distant to talk with.

1:15 a.m.—We are making twenty-five miles at 1,000 feet now. The stars are shining brightly, and when the moon dodges behind a cloud, it is still possible to make out the shadows between open and wooded country. Up from below comes the occasional jangle of cow-bells and the mighty chorus of crickets who are whooping it up rather late.

2:15 a.m.—Eric has relieved me on watch. We're at 900 feet traveling north northeast. He can have the beautiful thoughts now. I'm going to try to get some sleep. A loaf of bread makes a great pillow.

3:15 a.m.—We just spoke to *Navy Number One* with signal lights. They are to the west of us and slightly north. But they wouldn't tell us anything. We're down to 500 feet making twenty-five miles, and we've used only one bag of ballast. The moon has disappeared. We occasionally see open fires in the woods—Texas bootleggers making "corn."



Lieutenant Eareckson and Captain Moore, pilots

4:15 a.m.—Back on the bridge while Eric snores. We have a thermos bottle of hot soup that is very warming. Not that it's cold. It's comfortable even in one's stocking-feet. That's too bad, in a way, for Eric brought with him a suit of fleece-lined pajamas, orange in color. The lights of Tyler, Texas, gleam to the east and I can hear the puffing of locomotives. The sky is beginning to lighten. We're still at 500 feet feet and making twenty-five miles over a ghostly countryside.

5:15 a.m.—It is daylight and all hands are on deck to identify our position positively. Farmers are beginning to stir. We're at 700 feet now, making twenty-five miles per hour. We have nineteen and a half bags of ballast left. The best I ever had was sixteen bags at this hour in the morning. A farmer has just told us we are in Upshur County, Texas. That's good speed. We ought to be sighting the Mississippi by nightfall. We can count six balloons on the horizon, but all too far away to identify. We think Settle, Hineman and Buie are ahead of us. Hineman appears to be making better speed at about 2,500 feet but we are conserving our ballast. We dropped a note reporting our assailant, and a boy with a dog picked it up.

6:15 a.m.—We are now enjoying breakfast at 2,000 feet. Our speed has dropped to fifteen miles up here, but we will save ballast if we do not crack our valve. We plan to ride at pressure height equilibrium and save our ballast for tonight and tomorrow. We're both badly sunburned from working all day in the open field yesterday and so we have let down our rain canopy, which has transformed our basket into a Turkish bath.

7:15 a.m.—Our altitude is now 2,500 feet, and our speed has dropped to ten miles an hour. On the distant horizon is trouble! They look like a flock of puppies hurrying after one another—convection cumulus clouds. They will be building up into thunderheads soon and we must stay above them. We haven't spent a handful of ballast since daylight. Drowsy.

8:15 a.m.—Altitude 3,000 feet, speed ten miles-minus per hour. Look at those darn convection cumulus build up! From every open field they are rising. No longer are they mere puppies. They're acres-square patches of fleece and they rise like the genie of Alladin's lamp from nothing—just heat from the open fields condensing as it finds cooler air. They go drifting by in great patches, colliding into one another, swelling in size, piling up ever higher. They are thickest on the eastern horizon where the sun has been burning down longest, but now they rise on all sides. Let them! They can't bother us for hours yet. We're back under our rubber rain canopy with the heat beating down in waves. We've still got nineteen bags of ballast left, and we breakfast a second time on a can of chicken.

9:30 a.m.—Wham! We just got socked by an early-rising convection current. Normally they don't bother one before eleven in the morning, but this is a damn hot day. It slapped us when we weren't looking, and if we were prize fighters we'd claim a foul. We went from 3,000 feet plus to 200 feet before we checked, and it cost us two bags of ballast. We passed over the roof of the railroad shack at Simms, Texas. The ground breeze was up to fifteen miles. We could stay low and make distance for a while if we wanted to crack our valve and spend the rest of the time valving gas and throwing ballast, until our ballast was gone. But that isn't how balloon races are won. So we are going back upstairs to keep above those cumulus clouds. And are they thickening! They're hunching together and piling up as though they were out for Soucek's record.

10:30 a.m.—We're at 5,500 feet now, northeast of New Boston, Texas. Ahead is the winding ribbon of Red River, marking the border of Texas, Oklahoma and Arkansas. We're going to miss Oklahoma only by a mile or two. It has cost us two more bags to get up here but the damn cumulus keeps rising. It's on all sides of us now. We can see only one balloon ahead of us and two behind. There simply is no wind up here. I doubt that we are making six miles an hour. But we've got to stick it out until six o'clock tonight when the cumulus will flatten. Fifteen bags left.

11:30 a.m.—We are drifting slowly over Red River southwest of Ashdown, Arkansas. Maybe we are making eight miles an hour. Boy, is that white stuff piling up! We're at 6,500 feet and our ballast check is only thirteen bags. Thunderheads are building behind us and in front. We see only patches of the ground. We've had a couple of narrow escapes from convection currents. They've been so close you could feel them cooling our gas, like opening an ice-box on a hot day. I never piloted in stuff like this, but Eric is a veteran and knows just how to fool them. He's been handling the ballast since our first drop; it would be suicide for our hopes if I were to try to battle

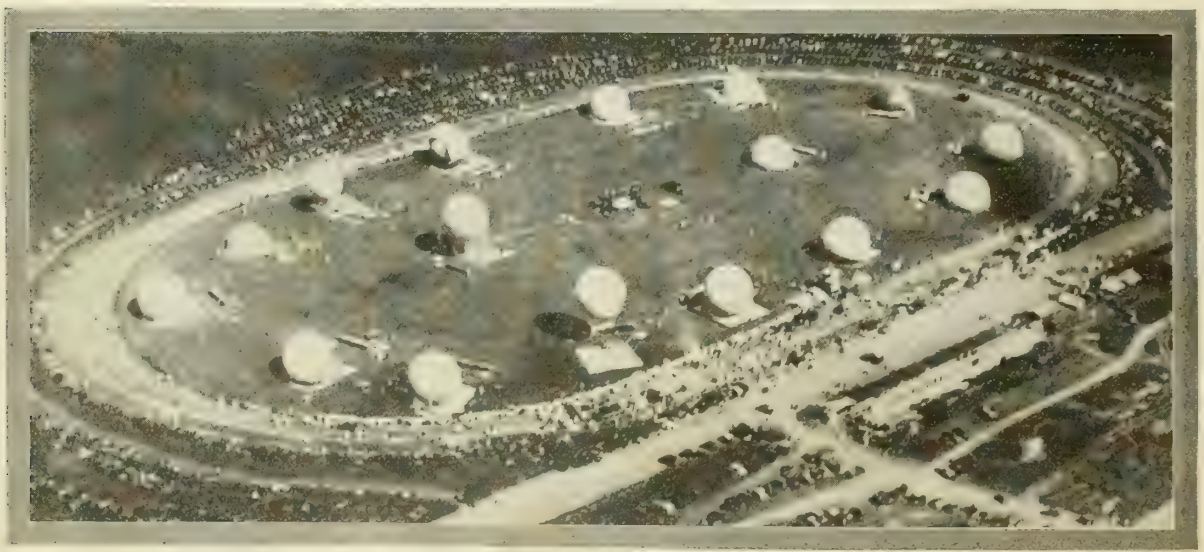
these clouds. He's cheerful about it, though, and tells me that it is at 2:00 p.m. the unexpected always happens in balloon racing. I hope it will be something good.

12:30 p.m.—Boy, howdy! We are up to 8,000 feet and I've just put on my sweater. It's chilly. Eric is still wearing a polo shirt and says he isn't cold. We are crossing Little River near Ben Lomond, making a poor six miles an hour. I'm looking at one of the most beautiful sights I ever saw—but I'd enjoy it more if it didn't threaten disaster to our race. We are in the middle of a Gargantuan witch's cauldron! On all sides of us convection cumulus are swirling and whirling and boiling in fury. They collide silently and shoot out at the top like a mile-high jack-in-the-box. Just to the west is a mean-looking thunderhead. It's growling and rumbling, and where there's that kind of thunder there's lightning. We've climbed up here at the cost of four more bags of ballast. We can't spend sand like that for long. Nine bags left.

1:30 p.m.—Altitude 10,000 feet, west of Dierks. We can hear the saw in the lumber mills below. It's uncanny the way those clouds are chasing us. They seem almost human. The bogey-man illusion is heightened by their constantly changing shapes. It isn't poetic imagination, either. There to the left are two Titan gladiators with shields and drawn swords rushing towards one another. Behind us an old crone is haggling with Neptune, who is about to strike her with his trident. I hope he does, and someone gets *him*. Ahead of us two hook-nosed hags are arguing. Gad, will those clouds never stop climbing? Apparently not! Higher and higher on all sides they rise. The growling thunderhead behind us is being answered sharply by another ahead. And the damn white stuff is shooting up and up. We've been trying to conserve our sand by throwing out surplus equipment. We've heaved our electric light batteries, a good part of our food and two of our four cans of water. We'll need four bags of ballast to get through the night and we're down to five now. It's cost us four bags, in addition to the disposable equipment, to get this high. I doubt we are making five miles an hour. If they'll only leave us alone, we can ride for nothing until the sun is low. They ought to, the damn sun is in reverse gear for an hour or more. But no! To the west is a formation of alto-stratus, a screen hanging halfway down the side of the world from 15,000 feet. It's been there a long time but hasn't bothered us much because the upper veil was mackereled and the sun shone through. But now the sun is dropping behind. That means we must spend more ballast, for our gas will cool when the sun is hidden. What a combination of luck! Over the side goes a two-pound box of special pastry that a lovely girl in Houston gave us. We'd hardly touched it. The thunderhead ahead is growling more ominously now.

2:30 p.m.—Eric was right! At two o'clock things happened. Two giant thunderheads rushed together square across our path. We had to drop ballast fast to keep them from getting us. We could feel their icy breaths. But we fooled them. Three bags of sand and the rest of our food, fruit mostly, went over the side. Now we're up to 13,500 feet. My teeth are chattering despite an extra coat. Even Eric had to put on the coat of those orange fleece-lined pajamas. We haven't traveled two miles in the last hour. Dierks and its whining lumber mill is still below us. We can hear the sharp detonation of something that sounds like cannon. Maybe someone got hit by that box of pastry, and they've unlimbered the village anti-aircraft to shoot us down. We can feel heart action turning up in high. We've only two bags of ballast left, but we still have our parachutes and drag-rope to use for ballast. If only those damn clouds will leave us alone now we can still last out until morning. That thunderhead ahead of us is crackling spitefully again, and the one to the west is roaring answer. We ask you, man to man, big boys, we've licked you fair and square so far haven't we? Well, lay off us now and give us a fighting chance.

3:30 p.m.—Sandbagged! We're whipped! It was a combination of things. That damn alto-stratus cloud for one thing. The sun played African dodger again. An eruption from the thunderheads like Vesuvius, for another. And no two young men, no matter how clean living, can stay alert and eager three miles high with practically no sleep for thirty-six hours. The last we remember we were still on top of the thunderhead, hoping our luck would change. When we came to we were at 8,000 feet and dropping like the proverbial plummet—though I have never seen a plummet. The sudden descent was rather painful. It came to me as though someone had hit me a rabbit-punch with a set of brass knucks. Eric felt it most about the eyes and ears. We're going down fast now. We've heaved the last of our water, but still (*Continued on page* 166)



P. & A. Photo

Aerial view of the entrants in the National Elimination Balloon Race at Bellaire Speedway, Houston, just before the start

AVOIDING THE CROWD

By Don Rose

EVERY now and then the American public is aroused to real sympathy for its unfortunate heroes. The sensible individuals who make up the crazy crowds begin to wonder how the central figure of the current disturbance is enjoying it. They recall that he—or she—is made of human stuff, and liable to weariness, boredom, indigestion and other human weaknesses. They wonder how the hero of the hour endures the round of entertainments, banquets, receptions, radio speeches, parades and parties which are part of the price of success as well as its reward.

I have it on the word of one of them that it is a fearful grind. He is one of aviation's fair-haired boys, who is just now getting a thorough scorching from the spotlight of public attention. In an off moment between handshakes and smiles he assured a circle of sympathetic newspaper folk that the hardest part of his triumphant achievement was the national vaudeville show which followed it. He had a part to play and an act to put on in every chief city of America, and at every appearance he had to live up to expectations and give the customers their money's worth. He was being watched by a million eyes and censored by a million ears. He could neither spit nor swear nor slacken his belt and put his feet on the table without the whole nation knowing it. He was doomed by his fate and fame to smile until his face hurt, to say and do what was expected of him, and to eat fried chicken until he hated the sight of a fresh egg because of all that it implies.

In this neighborly nation which thinks so much of personalities, there is no privacy for the public figure of the moment. Much has been made of the sorrowful lot of the goldfish, who lives in a glass house and is not even allowed to throw stones at the silly faces of those who stare at him, but the goldfish has a quiet and private life compared to the man or woman who has caught the fickle fancy of the public for a few months or moments.

This, of course, is a part of the job of being a public personality, and it pays the bills and profits for all sorts of notable achievements. Those who fall short of real success are hungry enough for just such attention. But those who are the headliners of the day's news must often wonder whether they could not get along nicely with a little less of it.

It may be, for instance, that Father Lindbergh is realizing now that he must pay heavily for all the satisfaction, fame and minor emoluments which he gained by his lone flight to Paris. He stood up very well under the pressure of public attention when the world insisted on making a hero of him, and was consistently modest, discreet and sensible about it. After a while, however, he showed signs of running away, a natural impulse which some of the newspaper boys chose to consider a personal affront, though nobody knows why a man who had done a great thing should be sold into slavery for it and compelled to come to heel whenever a reporter whistles.

But the spotlight followed him everywhere he went, missing him now and then for a little while but never allowing him more than a few moments privacy at a time. From what I remember of my own distant experience, it must have been a little difficult for the Colonel and the lady of his heart to become adequately acquainted under such circumstances. He needed all his genius, persistence and endurance to arrive safely at matrimony, with so many friendly snoopers trying to take a hand and so many professional gossips trying to tell the neighbors all about it.

But a manifest change has lately come over the Colonel's public importance. The safe landing of Charles Augustus, Jr., has pulled his "proud popper" off one pedestal and set him on another which is no less honorable but a little nearer to the level of the rest of us. For Father Lindbergh has now joined the world's biggest fraternity as a junior member who has still a lot to learn. It's a safe bet that he knows no more about babies than a million other men in the United States, though he may think he does. There may have been many who have envied him his fame and good fortune, his unparalleled achievement and all that came of it, but they will all forgive and forget as they contemplate the Colonel struggling with a safety pin or trying to take the baby's picture.

Colonel Lindbergh is also eligible at last for full membership in the Husbands' Protective League. This is an organization designed for the defense of married men against the slings and arrows of outrageous fortune, which I personally organized some years ago in response to a crying national need. I was led to do so by the discovery that everything and everybody else was thoroughly organized, from prohibitionists and pacifists to plumbers and parachute-jumpers, but the vast, amorphous, indeterminate, non-autonomous millions of husbands were still muddling along without benefit of union, lodge or organized solidarity. It seemed to me then—and does yet—that husbands need protection; that united they may stand, while divided they must all take a back seat. So I formed the Husbands' Protective League. My right to do so was based on the fact that I come of a long line of husbands myself. And as founder of the league and one of its charter members, I welcome Colonel Lindbergh into the world's greatest and most democratic society, where the fact that he flew the Atlantic is interesting but unimportant compared to the baby's first tooth or the fact that he needs a bottle at five o'clock in the morning.

It is difficult to resist the temptation to give the Colonel and his lady a lot of good advice on the bringing up of children. But the best hint I can spare them out of all my experience is that they should listen politely to all the advice that is offered them and take as little of it as possible. They should be particularly warned not to bring up young Charles Augustus on a book. More children are spoiled by being brought up on a book—which is usually written by a whiskered bachelor or a settled spinster—than were ever hurt by the well-meaning stupidity of parents. And I suppose it will be quite unnecessary to suggest to the Lindberghs that they need not take seriously all the prophecies and speculations which have buzzed around the sleepy head of their young hopeful ever since he first opened his eyes on the whirling world.

Most of these have tried to forecast what the world will be like when Lindbergh the Second is old enough to take it by the tail. His birthday was a swell excuse to revive the spirit of prophecy and anticipate the busy airways of the future, the strap-hanging crowds in the 5:15 dirigible to the suburbs, the nonchalance with which the next generation will go up when it wants to go anywhere. If these forecasts are correct, then (*Continued on page* 162)

The PRINCIPLES of AERODYNAMICS

ARTICLE 2. AERODYNAMIC LANGUAGE

Dr. Max M. Munk

THE Tower of Babel could not be completed because the people building it could no longer understand each other. We are gradually getting to the same point. Every day sees the invention of new words, and every day sees also the indiscriminate use of pairs of words which previously meant different things. Words are increasing in number while their differences of meaning are diminishing, so that it is probable that eventually all possible verbal sounds will have the same meaning; they will mean nothing as well as everything.

Fortunately, this condition has not quite yet been reached, particularly in aerodynamics where there still remain several words which mean different things. "Vorticity" and "viscosity" each have an individual meaning, although not everybody may be entirely clear as to their exact connotation. What are their opposites, if anything? Who knows what "potential flow" means, and when is a flow a potential flow and when not? How is it possible that several kinds of pressures can exist in the same air at the same time?

In this article we shall try to explain only such words referring to air motions and air forces as are actually indispensable in discussing the details of aerodynamics. These words say nothing about the physical principle of aerodynamics, or about the creation of air forces, which has not already been said and discussed in the first article of this series. Airplanes are carried by the air—not by words. Nevertheless the carrying process can be explained more intelligibly and figured out to better advantage by the use of a few special terms.

Air forces acting on heavier-than-air craft are the reaction of the air to changes in its state of motion. It is desirable to classify these changes and to describe them in detail.

The complete description of the motion of a snake is cumbersome, because every part of it moves differently. Yet, every part of it does not move entirely independently of the other parts, for the action of all are interconnected and the length of different portions of the snake must always remain the same. The complexity of air motion is much greater than that of snake motion. Each particle moves somewhat independently, but not entirely so. The volume of each amount of the air remains—practically—constant. The complexity of the motion is greater than with the snake because whereas the latter's motion is sufficiently described in along one dimension, along its backbone, the motion of the particles of air is in all three dimensions of space.

Indeed, the problem of describing the three-dimensional motion of air is so formidable that we should not have a single airplane built if a complete description of three-dimensional flow were necessary for designing aircraft. Fortunately it is not. For the purpose of airplane design we must know much less about it. It is sufficient to possess a general understanding of three different classes of air motions and to distinguish them from each other. These are two-dimensional flow, steady flow and potential flow.

A two-dimensional flow is like a book in which all the pages are alike. One need read only one page, and such a page has only two dimensions. In a two-dimensional flow the air is supposed to flow parallel to a plane and alike in all parallel planes. Such flow occurs around a strut at right angles to the direction of flight. That case is the only one I can recall and is certainly not important enough to justify the introduction of a new conception. We shall principally deal with two-dimensional flows which do not actually occur. That may sound unsatisfactory, but it is not. We have just seen that three-dimensional flows—and all real ones are three-dimensional—are very difficult to describe and handle. In important cases it is therefore easier to consider them as a combination of two-dimensional flows. Thus, if the strut is inclined relative to the direction of flight, we may say that there exists in combination a flow of air parallel to the strut and a flow of air around and at right angles to the strut. Each of these is two-dimensional, and in combination they make three-dimensional flow. The opposite of a two-dimensional flow is one distinctly three-dimensional—that is, without parallel planes having equal motion.

In a steady flow the air particles move from point to point, but the air velocity remains constant. In a waterfall, each particle arriving at a certain point assumes there the velocity the preceding particle had. At each point there exists therefore always the same velocity, but not the same particle. The entire picture of air motion remains always the same, like the picture of a waterfall, but it is continuously formed of new particles. If we know a steady flow at one time, we know it at all times, because it remains the same always. We need not consider the time element (not directly at least), which is an advantage. A steady flow is practical for engineering computations. The opposite condition, an unsteady flow, looks different from time, like the water from a bucket thrown high into the air.

A steady flow may be two-dimensional or three-dimensional. This gives us four combinations of flows concerning which we can now make classifying statements.

A potential flow is the most difficult of the three to explain, because "potential" has a special mathematical meaning foreign to airplane design. It would be improper to enter into mathematical arguments about it in an article on practical airplane design. It is sufficient to know that potential flow is the motion the air would assume if it had no friction, and that it is a relatively simple, harmonic, mathematical, theoretical and ideal flow, which never actually occurs but which in many important cases constitutes a serviceable and close approximation of what really happens. It is particularly suitable for explaining the facts in general, in that it leads to convenient formulas and equations giving the numerical relations with surprising exactness and more satisfactorily than many experiments. All theory deals with potential flow rather than with actual flow because the latter is too complicated. The motion is smooth and in symmetry, like mechanisms without friction. The opposite of a potential flow is theoretically one having no potential, but in practice it is one that is rough and irregular, like boiling water, a state of motion which is characterized as "turbulent." In potential flow, each layer of air glides over the next layer, and this particular feature is designated as a "laminar" flow. Not every laminar flow is, however, a potential flow. "Laminar" and its opposite, "turbulent," refer to portions of the flow, not to the flow as a whole.

Potential flows have dis- (*Continued on page* 150)

AERO DIGEST

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FIVE TIMES THE FIVE-YEAR PROGRAM

IN 1931 five times the five-year program?

Several months ago we suggested that the industry begin to think about what course to take after the expiration in 1931 of the five-year program.

What preparation has been made? What concerted plans have been developed by the industry or the continuance of the old program, or the adoption of a new one? Undoubtedly the latter is the more desirable alternative and should be worked out with all speed. In fact, that which other nations are now doing, as well as that which this nation obviously needs, induced the thought expressed in the first line of this editorial.

Our national defense requires at least as many planes as such a program would supply; our engine manufacturers and aircraft builders must have at least that volume of business from the Government to keep them on their toes, ready and equipped to serve in time of emergency. The next war will start with a quick and terrible blow by the aggressor, whomsoever he may be. It will be warded off or prove fatal to the attacked in exact proportion to the preparations made to meet it.

An aircraft program five times as great as the present one will not be possible unless it is mapped out and worked for in advance. Here is something *real* which the Aeronautical Chamber of Commerce might be doing. Every unit of the industry would directly profit, as every citizen in the nation would indirectly profit, from a movement of the sort.

And it might save us from invasion—it is wise not to forget that.

On or about June 15th the Army placed orders for nearly $12,000,000 worth of planes and engines; the Navy's orders brought the total up to almost $20,000,000. We need this business and we need the new business which a rationally great defense program would bring.

LATIN-AMERICAN LINES UNITE

WHEN a rumor of the possibility of an amalgamation between Pan American Airways and New York, Rio and Buenos Aires Lines met with an emphatic denial last January, we expressed the hope in the February issue of AERO DIGEST that all obstacles to such a union would be soon removed, because we fully believed that collaboration of these groups under one effective and permanent management would react to facilitate greatly Pan-American commerce. For the country that gives Latin-America the first comprehensive airline service will gets its export and import business.

"The sooner and the more efficiently all United States aviation interests down there are hooked up under one fully competent management," we said, "the better showing we shall make in South America and the quicker we shall make it."

By the time this issue of AERO DIGEST reaches the reader this important combination will have been consumated.

The basis of exchange of stocks will be five and one-quarter shares of NYRBA for one share of Panair. Eventually the business interests of the United States will profit more than any of the individual stockholders of either of the companies involved. Yet, such comprehensive air transport service will mean even more for Latin-America than it does for the United States, for only this most modern form of transportation can fully meet conditions in the countries to the south of us.

AND ANOTHER—

PERHAPS before this is printed, announcement will have been made that Western Air Express and T.A.T. have merged. It is certain that this merger can be credited to the Watres air mail bill. Perhaps it indicates that before granting the transcontinental air mail contracts Postmast General Brown demands the elimination of useless competition in the interests of efficiency.

The merger will probably involve formation of a new company in which the assets of the old ones will be combined for the purpose of supplying an ideal transcontinental air mail service . This does not necessarily imply that all the assets or all the activities of either company will be confined to air mail operation, but it should mean much for the air mail in any event.

T. A. T. in the past has not carried mail at all, but the injection of Western Air Express' excellent management, under Harris M. Hanshue, as well as its wide experience and unexcelled personnel, into the T. A. A. service will be of value to the nation's air mail users.

FLYING CROSS OR DOUBLE CROSS?

OCCASIONALLY we hear mutterings about the Distinguished Flying Cross, hints that it has fallen to the level of a political plaything, or, what would be almost as bad, that for one pretext or another it has been withheld from those who deserve far more than many who now actually possess this coveted medal.

The latest example of official flim-flamming on this score was the failure to award Bernt Balchen the Distinguished Flying Cross at the time it was presented to McKinley and Smith, of the Byrd Antarctic Expedition. Balchen was the man who actually flew the famous plane, *Floyd Bennett,* from Little America to the South Pole and return.

Three years ago the same medal was withheld from Balchen and Bert Acosta, Byrd's trans-Atlantic pilots, while a Secretary of the Navy publicly apologized for pinning it on Byrd and Noville without giving it to the other two. His excuse was the same that is still offered by those who are by law authorized to give out this coveted medal: that those who receive it must be members of the military forces of the United States.

Chamberlin was denied the Distinguished Flying Cross on the same grounds after he had flown to Germany in 1927, but Congress found a way to present it to the *Bremen's* crew, all foreigners and one a non-pilot, for their non-stop westward crossing of the North Atlantic; it found a way to give it to Coste and Lebrix for their South Atlantic and four-continent flight of 1927 and 1928.

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SEAPLANE BASES

Earl D. Osborn
President, Edo Aircraft Corporation

FOR years it has been pointed out that, inasmuch as almost every large city is situated on a body of water, it would be possible by means of seaplanes to land aerial passengers within a few minutes of the center of town, whereas conventional airports usually must be situated in the country, some distance from the business district. The advantages of seaplane bases thus located could not be denied, but because they were not being established, people began to think that there was some hidden joker in the proposition. The joker was simply that until a few years ago there were on the market no civilian seaplanes or flying boats which gave reasonably good service. Since there were no commercial seaplanes available, there was little to be gained by building water landing docking facilities.

The result is that now when seaplanes have become available there are few operating bases for them. Because several seaplane bases can be built for the cost of one well-equipped airport and because seaplane bases can be located near business centers and adjacent to crowded residential districts, it appears certain that there will be a constantly increasing number built. Their design, therefore, is worthy of most careful consideration.



A Fleet seaplane making a landing near small motor boats

Before discussing the essentials of an ideal seaplane base, we must consider the handling and operation of the seaplane itself. Seaplanes can be maneuvered accurately in a calm or when headed directly into the wind, but in a side wind or when going downwind, they are difficult to steer and require an ample amount of space. For this reason a water front crowded with small boats is undesirable for seaplane operations. If no other space is available, however, the plane may be towed into open water or back to the dock. This lack of maneuverability also makes it impractical to locate seaplane bases any distance up canals or narrow rivers. The outlets of canals or small rivers, however, often form very suitable places.

Since seaplanes do not draw much water, the base can be situated on water which would be too shallow for motor boats or sailing craft. Shallow water has an additional advantage in that it is not so apt to become exceedingly rough. Moreover, planes can be moored to buoys more easily in shallow water, and there is no danger of serious loss even if the plane should sink.

Seaplanes require a rather long run in taking off. If it is necessary to taxi a great distance downwind, to get in position for a take-off, motors will heat up and pilots and passengers will grow impatient. A location which is on a projection of land will, therefore, have the advantage of allowing a greater number of take-off directions without excessive taxying. Consequently, if there is a harbor or large inlet, it is better to establish the base some place along the side or even at the entrance rather than at the head.

There are many places so located that a short taxi run will bring the plane in position for an unlimited take-off in any one of three directions. In the case of a river, it is better to locate on a bend than on a straight stretch, and better to be on the inside than on the outside of the bend. Except where it is absolutely impossible to do otherwise, the base should not be situated at the head of a long narrow inlet or bay Quite often the best locations from the taxying point of view are those most exposed to waves—in which case the choice becomes a matter of judgment. Where the wind has more than a two-mile sweep across the water before it reaches the base, sufficient sea can be kicked up to render launching difficult even on days when flying is otherwise entirely feasible. On the whole, however, most pilots do not object so much to occasional rough water as to taxying long distances before every take-off.

To bring a seaplane into a dock is more difficult than to get it away from the dock. Therefore, since seaplanes handle more easily when headed into the wind, there are obvious advantages in having the base face away from the direction of the prevailing wind. Such a situation is even more favorable if the base is so located that a few hundred yards of cross-wind taxying will bring the plane around a promontory into a position where the water is suitable for a proper take-off. Except where this condition exists, however, it is better that the base be facing or (preferably) cross-wise to the prevailing wind.

Strong tides and currents, which naturally make it more difficult to handle any water-borne craft, should be avoided in selecting an ideal base. Also, in some locations, back eddies cause all manner of driftwood to collect. Before a base is chosen, the water should be studied to ascertain whether debris tends to accumulate in it. Driftwood is not as dangerous near the base where planes taxi slowly as it is where the plane is taking off, but it is annoying at all times.

No definite dimensions can be given as to the area of water necessary for the proper operation of a seaplane. Although seaplanes ought to be able to take off easily in 2,500 feet, as required of a first-class land airport, it would be a mistake to attempt to operate from an area of this size, where the plane



North Beach, Long Island, a combined water and land airport used by Curtiss-Wright Flying Service and the New York Aerial Police

would be taking off toward high shores. An exception would be a location where a breakwater or sand spit separates the base from a larger body of open water. In general, it may be said that the minimum allowable area should be at least one mile by half a mile. If the base is on a river, the distance between shores should be at least a hundred yards. Even then there should be no high banks and there would be times when cross winds would prevent operation.

Where there is a water area of more than two miles, winds of more than twenty miles an hour velocity will cause the sea to run high enough to prove a serious handicap to small seaplanes. With larger machines larger areas can safely be used. In most cases, however, islands or peninsulas will break up the waves and give lee shores from which take-offs can be made. Choppy waves, even as high as two or three feet, will not bother the larger seaplanes, but any kind of ground swell coming in from the open ocean will render taking off and landing extremely difficult. For this reason it will be impossible, under some conditions, to operate from any location which faces an inlet to the open ocean, and which is greater than a quarter-mile in its width.



In Alaska planes are brought ashore by means of a derrick

It is desirable, of course, that there be low banks rather than high bluffs, both because with the former there are less apt to be gusty air currents and because such a place provides level ground on which to build hangars and park planes. A sandy beach is ideal, for the seaplanes can be nosed into the bank without any runway. Next most suitable is a muddy shore; and least desirable, of course, rocks. Especially if there is a tide, a shelving beach requires a longer runway, which is expensive to build. With a steep beach going off into deep water, a long pier is not necessary. On the other hand, planes cannot be left on too steep an incline. Moreover, in shallower water it is easier to moor planes, and the water is usually smoother.

A seaplane base must be designed for the particular circumstances at hand. The wider the shore front of the base, the easier it will be to get a plane in. If there are obstructions, such as docks, on either side, 200 feet of shore front is an absolute minimum.

In general there are two types of base beaches which can be used. The simplest and best type is a beach with a concrete or wooden ramp which more or less follows the slope of the beach. All the Navy bases have extensive concrete ramps on which many ships can be lined up. In most locations, however, because the beach either slants off too sharply, not sharply enough, or is too rocky, it is difficult to build a solid ramp over the whole beach front.

In this case, it is necessary to build the second type—that is, a dock with a ramp on the end. The ramp should extend down three feet or more below mean low water. Twenty-five feet is the minimum width for a satisfactory ramp, though fifty feet is much more practical. Even greater width is of course advantageous but more costly. Where the bottom recedes with a very gentle slope, the dock must be long, and it may be advantageous to have the level part of the dock narrower than the width of the ramp. This is inconvenient only when the wing of a flying boat must be supported. In some cases, a dolly on tracks is provided so that it is necessary to have a dock only ten or twelve feet wide. The most expensive part of a ramp is that lying below low tide. In order to save cost, the slope should be as steep as possible, but it is highly inadvisable to exceed a twelve-degree incline. The slope above low water should not be more than eight degrees, an even flatter slope being preferable. If the slope is too flat, however, the inclined portion will be unnecessarily long.

If the top of the ramp and dock is low at high water, the wing of the plane can swing over the dock and it is permissable to come up to the dock sideways. Yet, the dock must be high enough to remain dry when any normal waves are running. It has often been suggested that a T-shaped dock would be particularly good, for it would allow the plane always to be brought into the dock against the wind. Such an arrangement, however, would complicate matters considerably and when a high wind is blowing into the runway, the pilots can always let the plane drift into the dock sideways and backwards, until attendants catch the wing or tail and swing the machine around into a suitable position.

Three types of machines have to be handled on the beach, amphibions, flying boats and float seaplanes. The amphibions, provided they have brakes and the ramp is wide enough, will almost handle themselves. Flying boats can be run up a ramp of gentle slope under their own power as long as care is exercised to keep their wing tip floats clear of the ground. The same thing can be done with a float seaplane except that no help is needed on the wings.

Once on level ground, the machine can be handled more practically on some kind of a dolly. This is especially true when it must be maneuvered into a hangar. The type of dolly formerly used by the Navy was a cumbersome, heavy apparatus with large wooden wheels. It had a cradle which fitted into the bottom of the hull or the floats, but it was necessary to put the plane on the dolly when it was in the water, which required the help of men in waders. Unless the bottoms and the dolly were exactly centered, damage was likely to occur. Once on the dolly, the plane had to be hauled in by means of a tractor.



Seaplane base with double ramp which makes it possible for planes to come in against the prevailing wind from either of two directions



Seaplane, on a dock, resting on a movable platform by which it is wheeled into a hangar. Plane taxies onto platform

The more common practice at present is to use a flat platform and let the weight of the planes be borne entirely on the keels of the floats. The earlier types of these platforms were let down into the water on rails and the plane taxied directly up on to them. They were then hauled up by means of a winch, in much the same manner as a ship is handled on a marine railway.

In more recent installation, a wide wooden ramp is used instead of rails. The platform is put on six or more casters. At some seaplane bases the platform is let down directly into the water and the plane taxies up on it, after which both are hauled up together by a tractor. At other bases the planes taxi up on the ramp under their own power. The top of the movable platform is made flush with the top of the ramp and the plane can thus be taxied directly on to it. Occasionally, the level part of the dock or beach is made slightly lower than the ramp so as to bring the tops of each to an even level. In other cases, the slope of the ramp is continued to the top of the rolling platform by means of a removable section.



Approach to a low floating dock. A mechanic catches the wing and backs the plane in so passengers can alight

Once on the platform, the plane can be pushed around on any level concrete section with considerable ease. Since it is on casters, two or at most three men can maneuver it in any direction, and if it is necessary to go up a slope into a hangar, an automobile can tow the platform. The platform on casters, I believe, really allows planes to be stowed away in a hangar more easily than land machines of corresponding size, for the platform can be moved sideways and it is not necessary to raise the tail of the machine.

The ramp ought preferably to be made of wood, because of its lower cost, and because it is more slippery and therefore less liable to wear the keels of seaplanes or boats. The dock ought also to be constructed of wood. Where a platform on casters is used, flat strips of steel can be laid over the wood for the casters to run on. The apron in front of the hangars should, of course, be made of concrete.

Usually, the Navy practice of having a ramp or beach wide enough to accommodate a large number of ships is not advisable for commercial work. Such a wide ramp made of concrete or wood is very expensive. Moreover, if there is more than one ship on a beach, there is danger that when other ships try to come in they may run into those already there. It is better to try to handle only one ship at a time from the runway. If there are several ships going in and out, they can be left at mooring, or if the wind is right, they can be tied to the dock and allowed to drift to one side. Planes can, of course, be nosed up onto a sand or mud beach where either is present, except with a heavy tide.

There are some locations where it is advisable to have a ramp which faces two ways. Such is the case in a river where strong winds blow up- or down-stream. If a ramp is built on either side of a dock, instead of on the end, it is possible to taxi up to the dock with the nose into the wind whether the wind is blowing up or down the river.

Barges have also been adapted as seaplane bases. In this case, when it is necessary to get a plane out of water onto the barge it may be brought up or be lifted out by a derrick. A second-hand barge is cheap when compared to a water front; it can be moored away from obstructions; it always heads into the wind, and its maintenance cost need not be excessive. Indeed, barges would be ideal for small seaplane bases were it not for the difficulty of getting passengers, crews, mechanics, baggage and supplies, from shore to the barge and back again. This is always an inconvenience and can rarely be worked out satisfactorily. Passengers like to step directly from the dock into their plane, especially when the water is rough or the weather bad.

There are, of course, innumerable other variations of ramp design. They range from a few planks laid on the sand to elaborate structures of wood and concrete. No matter what the type, it is economical to build the ramp well; otherwise, it may damage the ships and will require constant maintenance.

All the factors which apply to airports, such as availability to good ground transport facilities, nearness to centers of population, freedom from fog, etc., apply equally as much to seaplane bases. These matters must be studied carefully in each particular case. Careful analysis of the existing conditions, including a survey of the shores both from the air and from the water and land, will more than repay the effort required for such an analysis..

Now that we have efficient seaplanes, it becomes well worth while to devote more thought to the bases from which they are to be operated. And many cities located on rivers, lakes or ocean coasts and harbors can help increase the desirablity of flying by establishing seaplane bases properly laid out, well equipped and conveniently accessible to their business districts.



Semi-circular floating ramp used by Air Ferries, Ltd., to facilitate handling of passengers on San Francisco-Oakland line

AIR—HOT AND OTHERWISE

What Is Wrong?

By Frank A. Tichenor

"WHAT is wrong?" Letters come to my desk every day asking that important question; and rarely a day passes in the course of which some wise guy (the term is used respectfully, although as I write the thermometer on Forty-second Street reads ninety-nine) not only attempts to tell me what's the matter, but how to remedy it. I am waiting for the day when opinions on this subject shall be unanimous in one mail, and then I shall come to my conclusion—which, because my correspondents so often have guessed wrong, will probably be the opposite of that indicated.

That there is something wrong with aviation is beyond a doubt. But our industry has not had time enough to invent a really original commercial sin. That which is wrong with aviation is the same as that which was once wrong with railroads, later was wrong with motion-pictures, still later with radio. The Wright brothers were creative minds, but the business men attempting to capitalize their epochal idea have made mistakes, some of them almost as startling as the flying dewdad of the Wrights at Kitty Hawk seemed a quarter-century ago. The difference is, however, that the achievements of the Wrights were really new, whereas the errors of the resulting industry's big business men in this summer time of heat, depression and one-piece bathing suits for pretty girls are the same as those made by the manufacturers of arrowheads among the Mound Builders. The operators of Big Business among the Mound Builders gradually learned organization and coöperation. Or perhaps they didn't. Probably, in fact, they didn't, for they became extinct.

Centuries afterward the early railways, skilled in the production of bad accidents, because their managements sought a means of eliminating inquiring stockholders, discovered that slaughter was depleting national resources of stockholder and passenger raw material. They therefore adopted safety measures at the financial as well as at the operative end. A white faced bondholder bleating to high heaven that railroad management had manipulated him out of his undershirt was a bad advertisement for the vendors of railway securities.

In every great American activity the early days have been bad days—days of poor management, mistakes and an occasional slip on the hard, smooth ice of ethics.

Aviation has not yet passed its early days. Just as the other now great interests in their time needed reorganization, we now need it, eliminating from our picture those who "happened" to be in it—in it for themselves and not for building up the industry; in it for selling stocks irrespective of their intrinsic value; in it for tin-whistle reputations and a petty period of strutting stupid stuff that helps nobody get anywhere—as is illustrated by habitual procedure in that potentially valuable but actually gutless organization, the National Aeronautic Association. The promoter bent on reaping that which he has not sown, at the expense of both the public and the industry, must, along with other rubbish, be swept from our runways.

The late disaster in Wall Street rendered American aviation a real service. In a few short days of furious retching, many crooks and fools were purged out of our system. No industry ever has grown if "led" by men such as some of those who achieved momentary power with us in 1927, '28 and '29. An executive told me the other day that he has eliminated a million and a half from his company's yearly payroll in six months, and will cut off as much more in the next half year, thus speeding up, not slowing down, his organization, and increasing its chances of making a profit.

With shrinking fingers which are repelled by the feel of the slimy things, American aviation is getting rid of the innumerable leeches which fastened to its skin while it was too busy to take notice and have been sucking out its blood. Such disgusting creatures fasten to the tender skins of all young industries when, having grown to brain and muscle power, they first venture into the deeper waters of the industrial swimming pool. The man who draws a salary without rendering actual service is a leech. Sift the salt of real efficiency on him and he'll liquefy and melt.

The necessity for salt-shaking has made those who are the source of funds stop and think before investing. That's good, not bad. If the investors in American aviation companies had been more conservative and careful, they would have saved millions for themselves and the industry which, rightly operated, can make many, many Croesuses—or, better yet, a multitude of moderately prosperous.

We don't want a gullible public to put money recklessly into aviation as a speculation. We want a wise, conservative public to put its money in very carefully as an investment. In the last analysis the deflation, which is still taking place, is an admirable thing. Unfortunately many perfectly good people will suffer with the bad. In the World War even soldiers with most cleanly habits got cooties because the war-time ruck were careless in such matters. It is traditional that even the meticulous Kitchener had to "read his shirt" upon occasion. But for the good, there is a place in aviation. Let them stay good and they'll find it.

"Good," in business, applies to those who have learned not to burn their own tender fingers or set a million-dollar structure on fire in order to escape safely with a stolen quarter during the excitement. For the very best ability, for the highest kind of commercial honesty, for the greatest foresight, aviation offers unexampled opportunities. But it holds none for the manufacturer who builds and builds and builds without thinking of his market, asking bankers' help and usually getting it because the banker, like the balance of humanity, has been dazzled by the possibilities of the world's most wonderful new utility. Lenders have been almost as over-enthusiastic as borrowers.

Lack of experience may be offset by vision; where both are missing, pocket-woe abides. Many units of the industry have lacked every detail of environment, knowledge, psychology and commonsense which could have meant success.

Failures? Of course! Why not? Fools will rush in where angels mince their steps, or shyly look, listen and—stop outside. America's early aviation will be successful in the same proportion that America's early railroading was successful. Hard work, persistence, a backbone instead of a wishbone where the spine belongs, are the only things which can possibly do the trick. Lack of coöperation invariably will mean disaster, and coöperation without coördination must be futile. Coöperative coördination on wrong lines will mean nothing but quick and complete disaster. The (*Continued on page* 168)

THE 1930 NATIONAL AIR RACES

Curtiss-Wright-Reynolds Airport, Chicago, August 23-September 1

THE best guarantee of the success of the National Air Races from the viewpoint of 100 per cent civic support is the list of sponsors in the city of Chicago, where the event is to be held August 23 to September 1. Every officer and director of the Chicago Air Race Corporation is nationally known in his own line of endeavor. It's more than civic pride and enterprise that has assembled this group of eminent Chicagoans. They are contributing cash and enthusiasm and practical support, to demonstrate their faith in the aeronautical industry, with the confirmed belief that Chicago is its logical center and quite obviously the natural strategic point for all airway operations.

It was last October 15th that Colonel Robert R. McCormick assembled a few of the city's business leaders to organize an executive committee to bring the 1930 races to Chicago. The sum of $55,000 was subscribed on the spot. One month later the goal of the race corporation of $250,000 was over-subscribed—and that in the face of the market crash. That's how Chicago feels about the air races in terms of cold cash. It is a non-profit undertaking, too.

Colonel Robert R. McCormick, publisher of the Chicago *Tribune* and owner of a private amphibion, is chairman of the board, and Earle H. Reynolds, banker and aviation enthusiast, is president of the race corporation. Frederick H. Rawson, co-chairman of the board of the First National Bank, is treasurer. Captain Max M. Corpening is secretary. The directors are too well known nationally to need identification. The list, subject to a few possible additions, follows: W. R. Abbott, S. L. Avery, Aldis Browne, Britton I. Budd, Arthur G. Cable, R. T. Crane, Jr., Edward N. D'Ancona, Charles G. Dawes, B. A. Eckhart, Clarence R. Falk, Oscar G. Foreman, Leonard S. Florsheim, Charles F. Glore, Homer Guck, John Herts, Edward N. Hurley, Samuel Insull, Allan Jackson, Wm. V. Kelly, Weymouth Kirkland, Albert D. Lasker, John J. Mitchell, Harold F. McCormick, C. A. McCulloch, Julius Rosenwald, James Simpson, John R. Thompson, Warren Wright, Philip K. Wrigley, Jr., C. R. Walgreen.



Curtiss-Wright-Reynolds Airport, where the races will be run off, is one of the finest flying fields in the country. For ten days and nights, from August 23rd to September 1st, inclusive, it will be the scene of the air races.

The personnel of the executive committee is a guarantee of an efficiently managed event. The post of managing director finds Cliff Henderson once more on the job with a wealth of new creative ideas and behind him the record of those outstanding races at Los Angeles and Cleveland in 1928 and 1929. Field operations are under the generalship of a flying veteran, Major "Shorty" Schroeder. Major Reed Landis, World War ace who has done much to put Chicago in its prominent place on the air map, is directing advertising and publicity. Coördinating the work of these three is Captain Max M. Corpening, secretary of the race corporation. Captain Corpening has directed three successful national horse shows in Chicago, and he is an aviator as well.

It was 'way back in '26 that the unreformed and unregenerate Cy Caldwell got all het up over the slip-shod way in which the races were conducted, and pounding his typewriter furiously, advanced some constructive ideas in AERO DIGEST on how air races should be run.

Not only will all races start from scratch in Cy's suggested manner, a race-horse start; but before each race, the contesting planes will line up in pits before the grandstand bedecked in identifying colors. The race circuit is only five miles in length, and it will therefore be possible for spectators to follow the racing planes around the pyons with the naked eye. Whether the service entries will accept such a comparatively short course is not known at this time, but the five-mile racing triangle will stand for all civil events.

Another idea to interpret the races more fully for the audiences will be the derby finishes. A control point will be established a comparatively short distance from the field and the derby contestants will be brought in, in proper order, instead of stringing out to the confusion of spectators, as has happened in past races.

All events will be held to strict schedule. There will be no congestion of the program this year. Should weather or other difficulties force postponement of events, such events will be temporarily erased from the day's card and will be run off before the regular hour of the meet, the first suitable morning. This arrangement will eliminate the overlapping of events and consequent disarrangement of programs that has marked air races in the past.

Tentative plans for handling air traffic provide parking space on the airport during the hours of show atcivity, but no planes not entered in events will be allowed to remain overnight. Planes will be allowed to land and take off only between scheduled events. They will not, however, be allowed to land at will. Visiting planes will be allowed to land and take off only at stated intervals between program events. A huge Stop-and-Go sign is being designed to control flying passenger planes. If the red light is set against them, they must circle to the west of the airport. When the green light is flashed on, it will be the signal for them to come in and land. Landings and take-offs will be allowed only every ten minutes in each half hour. That such traffic may be easily and safely controlled was demonstrated dur-

ing the recent air parade the last week in May from various Chicago fields to the scene of the National Air Races. Most of the hundred planes which participated landed within ten minutes, without the slightest mishap. They took off with the same precision, despite the fact that many pilots were comparatively inexperienced. Only a few visiting planes can be cared for at the airport during the races. Most visitors must make reservations for hangar space on the twenty-two other airports in Cook County. The majority of visiting planes, which may total 1,500, will be cared for at other flying fields. No favoritism will be shown in recommeding airports to visitors; a list of all nearby flying fields and their hangar rates will be made available to all airplane owners in the United States, and flying visitors will make their own selections.

The Navy Department has agreed to send to Chicago one squadron of eighteen fighting ships, one squadron of twelve Marine Corps planes, a flying acrobatic team of six ships and the Naval dirigible *Los Angeles*. The War Department has promised full coöperation to make the races a success, but the details of Army participation will not be made public for some time.

As regards traffic arrangements for ground vehicles, Mr. Henderson said that experts had devised a plan for ten lines of automobile traffic to the field, which, moving at eight miles an hour, would bring 30,000 to 40,000 people an hour to the field. Parking space has been contracted for to the south, north and west of the airport, 246 acres in all. Special trains will run direct from the Loop to the field every ten minutes from noon to evening. Running time will be thirty-five minutes, and the round-trip fare, fifty cents.

A total of forty-four events have been approved by Major Luke Christopher, contest director of the National Aeronautic Association, which is the largest number of events in the ten years' history of the air classic. That figure does not include five air derbies, which will inaugurate the meet. Two derbies will be exclusively for women pilots, and one will be a non-stop race to Chicago, which will probably start from Southern California.

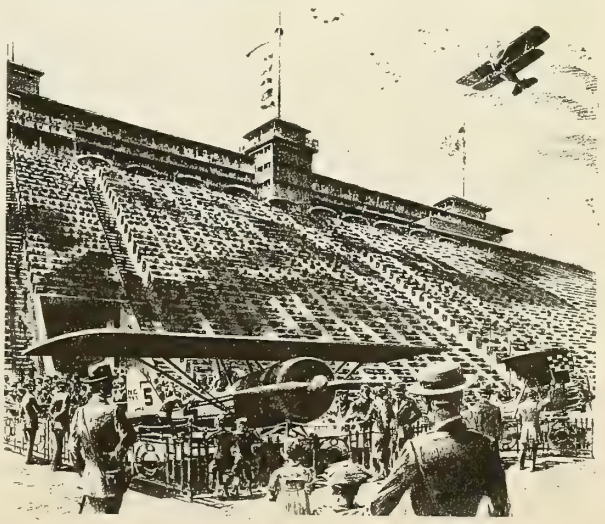
Civilian pilots will dominate this year's air races. Only five of the forty-four approved events are exclusively for the services, Army, Navy, Marine Corps and National Guard. All other events are exclusively for, or open to, civilian fliers. The race classifications extend from planes under forty horsepower to unlimited power plants, single and multi-motored planes. Free-for-all races are provided in eight power classifications. The major speed event will be for the Thompson Trophy, and a purse of $10,000. Total prize money will exceed $100,000. In addition, valuable trophies are offered. Five races are for sportsmen-pilots: fliers having no direct connection with the aeronautical industry.

In addition to the two women's derbies, five events are arranged exclusively for women fliers. Four are speed races for open-cockpit and cabin planes in 100 and 200-horsepower classes. The fifth event is a women's dead-stick landing contest. There is nothing to prevent girl pilots from entering the free-for-all events.

In the "mixed-doubles relay race," men and women pilots will be paired in a race from Chicago to Cleveland and return. Only one pilot will be at the controls at a time, flying one-half of the race. Whether all the male contestants will fly one lap of the race and their partners the other, or whether the relays will be mixed is being decided as this is written.

The list which follows constitutes the backbone of the racing program.

No.	Event	Piston Displacement
1	Women's Closed Course (Open)	500 cu. in.
2	Women's Closed Course (Cabin)	500 cu. in.
3	Civilians' Free-for-All	110 cu. in.
4	U. S. Marines' Closed Course	Unlimited
5	Civilians' Closed Course (Open)	275 cu. in.
6	Civilians' Closed Course (Cabin)	275 cu. in.
7	Civilians' Free-for-All	275 cu. in.
8	U. S. Army Closed Course	Unlimited
9	U. S. Army Closed Course	Unlimited
10	Civilians' Closed Course (Open OX-5)	510 cu. in.
11	Civilians' Closed Course (Cabin OX-5)	510 cu. in.
12	Civilians' Closed Course (Open)	350 cu. in.
13	Civilians' Closed Course (Cabin)	350 cu. in.
14	Civilians' Free-for-All	350 cu. in.
15	Civilians' Closed Course (Open)	450 cu. in.
16	Civilians' Closed Course (Cabin	450 cu. in.
17	Civilians' Free-for-All	450 cu. in.
18	Civilians' Closed Course (Open)	650 cu. in.
19	Civilians' Closed Course (Open)	650 cu. in.
20	Civilians' Free-for-All	650 cu. in.
21	National Guard Liberty Engine Builders' Trophy	Liberty engine
22	Civilians' Closed Course (Open)	800 cu. in.
23	Civilians' Closed Course (Cabin)	800 cu. in.
24	Civilians' Free-for-All	800 cu. in.
25	Parachute Jumping Contest	——
26	Civilians' Closed Course (Open)	1,000 cu. in.
27	Civilians' Closed Course (Cabin)	1,000 cu. in.
28	Civilians' Free-for-All	1,000 cu. in.
29	Civilians' Air Transport and Efficiency Contest	Unlimited
30	Civilians' Multi-motored Closed Course	Unlimited
31	U. S. Navy Closed Course	Unlimited
32	Thompson Trophy Contest	Unlimited
33	Civilians' Dead Stick Landing	Unlimited
34	Women's Closed Course (Open)	800 cu. in.
35	Women's Closed Course (Cabin)	800 cu. in.
36	Women's Dead Stick Landing	Unlimited
37	Civilians' Balloon Bursting	Unlimited
38	Civilians' Acrobatic Exhibition	Unlimited
39	Civilians' Speed and Efficiency (Cabin)	800 cu. in.
40	Sportsmen Pilots' Race	350 cu. in.
41	Sportsmen Pilots' Race	450 cu. in.
42	Sportsmen Pilots' Race	650 cu. in.
43	Sportsmen Pilots' Race	800 cu. in.
44	Sportsmen Pilots' Race	1,000 cu. in.



AVIATION IN THE SOUTHWEST

(*Continued from page 37*)

motor and plane servicing, and sale of parts and supplies.

National Air Transport

National Air Transport operates air mail and air express lines between New York and Chicago and Chicago and Dallas. Its planes fly approximately 8,600 miles daily, more than half of which is at night. National Air Transport has not engaged in passenger service but is now considering plans to enter this field.

The company, which is capitalized at $3,250,000 outstanding, recently merged with United Aircraft and Transport on a basis of three shares National Air Transport stock exchanged for one of United Aircraft. The value of its properties, which includes more than fifty airplane, shops and other equipment, approximates $1,200,000. Operations were started on the Chicago-Dallas route on May 12, 1926, as a night run. Day service was added July 1, 1929.

The line employs about 300 persons, of whom 254 comprise the operating and shop personnel, including thirty-five active pilots. Cities in the Southwest reached by National Air Transport are Ponca City, Tulsa and Oklahoma City in Oklahoma; Fort Worth, Dallas, Waco, Houston, Galveston, Austin, San Antonio and Brownsville in Texas.

As evidence of the hardy pioneering spirit of the National Air Transport pilots, it is interesting to note that night flying started on May 12, 1926, although the lighting on this airway was not complete until February 1, 1928, almost two years later.

Mail loads have quadrupled in the last four years, with the Southwestern route contributing twenty per cent of the National Air Transport traffic. The Ponca City-Tulsa spur was started as a feeder to the Southwestern route July 5, 1928.

The Southwestern division has an average performance of completing ninety-nine per cent of all scheduled flights, which is an unusual record, even for the mails.

Pan American Airways System

The Pan American Airway System operates mail and passenger service over 18,217 miles of airways in Mexico, the West Indies, Central America and South America. Until the advent of regular airline operations many areas covered by the system were open to travel only by burro or boat.

In the year ending July 1, 1930, the Panair system flew 3,522,076 miles without an accident. In July, 1930, the passenger planes of the entire system were flying 80,868 miles each week.

The system has forty-eight multi-motored airliners. These ships are equipped with two-way radio of the telegraphic type so that pilots may keep in touch with the company's ground stations which broadcast meteorological information.

The Mexican Aviation Company is the northwestern division of the system, Brownsville, Texas, being its northern terminus. The airport at Brownsville being used by the company is under lease to Pan American Airways, of Texas, Inc., an operating company, whose Brownsville payroll totals nearly $1,000 a day.

The Mexican Aviation Company was first organized to transport payrolls to mines and oil fields in Mexico to avoid the heavy tribute and losses due to bandits. It merged with Pan American Airways, shortly after being awarded the first Mexican air mail contract.

At present it operates lines from Brownsville to Mexico City, and from Brownsville to San Salvador, and from Vera Cruz to Merida. Planes connect with the Pan American Airways network through Central and South America and to Florida. The routes at Brownsville and Miami connect with the domestic U. S. air mail system.

The present daily service between Brownsville and Mexico City was inaugurated March 9, 1929, by Colonel Lindbergh. The regularly scheduled plane leaves Brownsville daily at 8:15 a.m. and arrives at Mexico City at 1:45 p.m. The northbound plane leaves Mexico City at 7:45 a.m., arriving in Brownsville at 12:45 p.m. Both the Mexico-bound and Texas-bound ships stop at Tampico.

The planes operated on this route are Ford trimotors. The line has a daily average of nine passengers each way, and carries more than a hundred pounds of mail on each trip. This is more than double the volume carried when the line was inaugurated. Peak volume was reached during the revolution of last year when capacity passenger loads were carried.

There is a three-times-weekly service(Tuesday, Friday and Sunday) on the Brownsville-Guatemala route, which was inaugurated on August 10, 1929.

Broadcasting stations of the Mexican division of Pan American Airways are maintained at Brownsville, Tampico, Mexico City and Guatemala City. Flight radio service is also maintained for passengers en route.

In addition to its transport activities, Pan American Airways also operates two personnel training centers at Brownsville. One is a school for mechanics, of whom there are sixty at the Brownsville airport. The other school is for pilots and specializes in instrument flying and transport operations. (The blind flying school was described in AERO DIGEST for April, 1930—Editor.)

Western Air Express, Inc.

Western Air Express began operations April 17, 1926, by inaugurating air mail service between Los Angeles and Salt Lake City. The necessary capital was privately subscribed, and there never since has been a public stock offering. Harris M. Hanshue is president and general manager; James G. Wooley is vice president in charge of traffic.

In its various operations the company uses Douglas biplanes, Boeing biplanes of two types, Fokker Super-Universals, Fokker F-10's, Fokker F-10A's, Fokker F-32's, Stearman biplanes and Loening amphibions. In all, the flying equipment consists of about sixty planes.

Western Air Express was the world's first financially successful airline and the first air transport company in the United States to pay dividends. The company is one of the nation's strongest independent operators and handled twenty per cent of the total passenger traffic last year.

In December, 1927, Western Air Express took over the operation of the air mail line between Cheyenne, Denver, Colorado Springs and Pueblo. In May, 1928, it established the de luxe air passenger line between Los Angeles and San Francisco.

Its major expansion during the year 1929 was the establishing of a daily air passenger service between Los Angeles and Kansas City, 1,425 miles.

In addition, W.A.E. established night air mail from Los Angeles to Salt Lake City, continuing at the same time its daylight service between the two cities. The San Francisco-Los Angeles line was extended to provide a daily service to Long Beach, San Diego and Agua Caliente. Western Air Express, through subsidiary companies, also provides

(*Continued on page 170*)



"The small training plane will undoubtedly make use of low-pressure tires, using them without shock absorbing members"

"The use of Airwheels without shock absorbers will come more and more into prominence"

"Oleo landing gears . . . combined with Airwheels, should make bad landings almost inexcusable"

"The Airwheel type of tire . . . may result in checking the necessity of larger travel of the usual shock absorbing devices"

"The Airwheel will have great effect on landing gear design"

"Airwheels with modified shock absorbers will be conducive to softer landings and tend to reduce stress in the structure"

Airplane designers and engineers recognize

AIRWHEELS

as a definite part of future design

The quotations shown here are from one magazine, AVIATION. They came from a section in which officials of airplane companies expressed their opinions of future trends.

Have you investigated these great, soft, rolling rubber pillows for your planes?

Have you seen, by landing demonstrations, how they make it almost impossible to "nose over" a plane by coming down on soft ground — how they roll lightly over the top of plowed fields, marsh land and sand — how they prevent wing dragging, even in an intentional ground loop — how they take off and land so gently that you can hardly tell when they leave or come back to the ground?

Only Goodyear can give you Airwheel safety. Goodyear originated this type of tire — and an important part of Airwheel performance is the special Goodyear hub, with patented internal, self-centering brakes.

Before you undertake to re-design your ships for any type of low pressure tire equipment — find out what Airwheels can do. Nothing else can give you the same tested safety. For information or engineering assistance in equipping your future ships, write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.

GOODYEAR

EVERYTHING IN RUBBER FOR THE AIRPLANE

PERSONAIRLITIES



BY by caldwell

FOR the first time since I started this biographical department, away back in the mauve decade, I present the history of a man who is not a pilot. That breaks an old custom of mine, but the man I want to tell you about is himself in the habit of breaking customs and traditions. He is Harold H. Emmons, one of the fathers of commercial aviation. (That's a dubious sounding statement, but then the exact paternity of commercial aviation always has been in some doubt.)

You know, it's very fine being a pilot; but with most of us the business of being a pilot would be practically useless unless someone supplied us something to fly. Well, Harold Emmons is the "Kingfish" of that great society, the Mystic Knights of Supply. He's the one who sees to it that all of the lodge members, known as Financial Sardines, chip in with the necessary dues to promote such undertakings as the Stout Metal Airplane Company, the Stinson Aircraft Corporation, the Detroit Aircraft Corporation, the National Air Transport Company, Northwest Airways, Incorporated, the Detroit Aviation Society and a few more which probably have escaped me.

Now, you have to admit that anyone who has acted as the "Kingfish"—otherwise an officer and director of such organizations as I have mentioned—certainly has done his part in procuring something for someone to fly around in. But not only that. Back in the days when it was considered not only amusing but desirable to decrease the world's available supply of Squareheads, the man who was selected to procure aircraft motors to aid in that hilarious endeavor was none other than Harold H. Emmons. He was lounging comfortably in the Navy at the moment, but was rudely awakened by an order transferring him to the Aircraft Production Board of the Army, where he functioned with such efficiency and despatch that twenty-three different engine-building plants in the country dashed about and produced nearly 102,000 aviation engines of seven different types, and costing $460,000,000. Thirty-two thousand of these engines had been delivered before the armistice, including 15,000 of the well-known Liberty motors, complete with cylinder water-jacket leaks.

All of which is more than sufficient reason why Harold Emmons' biography should honor this department, which offers him congratulations not only for his amazingly fine work for aviation, but also on the occasion of his fifty-fifth birthday; for it was on the 30th of June, 1875, that Harold Emmons was born in Detroit, Michigan. At that time the tallest building in Detroit was the old City Hall; there was no special reason for Detroiters visiting Windsor; and such great enterprises as the Penobscot Building, the General Motors Building, the Ford factory, Ray Cooper, and Harvey Campbell's white pants had not even been thought of. All of these great developments were yet to come when Harold Emmons became a resident of Detroit, and life was comparatively simple and untroubled. Horse cars ran on the streets and honest men ran for mayor. It was a very primitive period.

But Harold saw that the world not only was progressing, but that in the course of its progression it would likely progress into a lot of legal entanglements and require to be got out of them. Therefore he proceeded to fit himself to handle the law, that sharp-edged tool that Charles Dickens noted was more remarkable for its proprieties of close-shaving than for always shaving the right people. So well and conscientiously did Harold Emmons handle this tool that he has won the respect and esteem of everyone in Detroit, and therefore hasn't been forced to run for Judge, so remains respected. In fact, it is the respect and esteem in which he is held by wealthy Detroiters that has enabled him to steer so much Detroit money into aviation; for Harold Emmons is not himself a very wealthy man. This is a surprising statement to make of a man who handled $460,000,000 of the Government's money, but it's true. You see, he wasn't a dollar-a-year man, so he just took his officer's pay and let it go at that. An honest man is the finest work of God—and about the most unusual.

He was educated in the public schools of Detroit, graduated from the Central High School in 1893, and from the University of Michigan in 1897, with the degree of Bachelor of Arts, receiving his LL.B. degree in June, 1899. He was now completely packed with legal information and ready to let himself loose upon an unsuspecting world. That was in June—and July found him in the law office of Walker and Spalding, so you see he lost no time in getting to work to straighten out any legal matter, from the normal wife's dissatisfaction with the normal husband, up to the more intricate—and invariably more dignified—legal calisthenics indulged in by great corporations in their more playful moments.

Feeling the need for fresh air and sunshine, as a refresher after poring over the tomes of the law, Harold Emmons joined the Detroit Naval Reserves in April, 1900. This had no connection with the present Detroit Navy that is fighting the battle of the bottle up and down Detroit's waterfront; it was merely a Navy where one could sit out in the sun and take life easy. It was just a standard Navy, such as that which now leans up against the Brooklyn Navy Yard during the day and enlivens the nocturnal activities of the fair sex of New York during the evening. In that Navy of 1900 Harold Emmons worked up from ensign to lieutenant, until the war, when, as I have said, he was transferred to the Army and put to work.

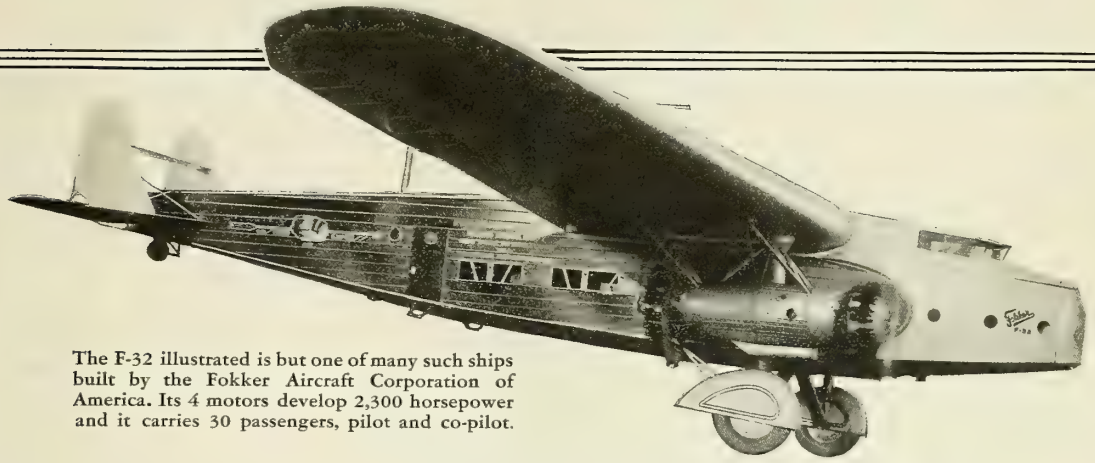
His work in the Aircraft Production Board may be judged by that enormous production of engines and by the recognition accorded him. He was awarded the Distinguished Service Medal by the Secretary of War, and was the first United States Naval officer to be thus decorated. He also received honorable mention by the British government, and was decorated by the Roumanian government with the Order of the Crown of Roumania, in the degree of Commander, which entitles him to visit King Carol at any time, day or night, accompanied by a chorus of Tiller Girls dancing to the strains of the Blue Danube Waltz.

After the war he returned to Detroit and the law and also threw his energies into developing commercial aviation and the Detroit Board of Commerce, both of which were flat on their backs when Harold first inspected them. The Board of Commerce was bankrupt, and commercial aviation hadn't even arrived at the dignity of being bankrupt, because nobody had ever loaned it anything. Harold got the board out of bankruptcy and got aviation into a position where it could borrow enough to go bankrupt any time it wanted to—which is about the way we leave part of it at this writing.

Harold Emmons has led a useful life, practically free of errors until recently, when, in a thoughtless moment, he accepted the position of Police Commissioner of the great city of Detroit. He was appointed by a mayor who swore that he was going to clean up the town, and that he wanted an honest administration. Little did Harold suspect that the mayor might have been joking—and probably was. It took honest Harold about four months to get the police department organized for action, to which it was quite unaccustomed. Then he started to act.

(Continued on next page)

☆ First Prize for Beauty ☆



The F-32 illustrated is but one of many such ships built by the Fokker Aircraft Corporation of America. Its 4 motors develop 2,300 horsepower and it carries 30 passengers, pilot and co-pilot.

Fokker-32 finished throughout with Murphy Aircraft Finishes

An editorial note in the June issue of Industrial Finishing has this to say about the F-32 exhibited at the New York Aircraft Show.

"First prize for the most beautiful plane was awarded to the giant Fokker F-32, the largest plane built in the United States, with a wing span of 99 feet. The color scheme is maroon with silver wings and aluminum colored 'pants' (wheel guards) on the under-carriage".

In the article on which the above editor's note was given, we find this expression "Color predominated at the show, proving that the aircraft manufacturers are alive to the fact that color is a real sales factor".

To these two comments, we add that the airplane industry is not only becoming more and more conscious of *beauty* for sales appeal, but is also becoming increasingly aware of the value of having *lasting beauty,* for wherever a manufacturer's ship may go, it stands throughout the months and the years as an irrefutable advertisement of the standards of the maker.

Murphy Aircraft Finishes are not only beautiful in first impression, but in lasting impression.

We shall be glad to send our "Specification Manual for Aircraft" to those interested.

MURPHY VARNISH COMPANY
Newark Chicago San Francisco
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Baking Material Specialists

Murphy Aircraft Finishes give not only beauty but *lasting* beauty



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Aircraft Flexible Finishing Lacquer Clear
Aircraft Non-Toxic Nitrate Dope

(*PersonAIRlities continued*)

He staged a big clean-up of gambling joints—particularly book makers—on the day when the mayor was attending the Kentucky Derby! Naturally he expected that the mayor would shower him with congratulations. But whatever the mayor showered him with, it wasn't congratulations. Instead of crooning softly to Harold, "Give Yourself a Pat On the Back," the pony-following mayor promptly gave him the sack, apparently for closing the gambling joints. That made a hit with Detroiters who like to go to those places and trade their money for the gamblers' experience. But in the meantime, for some other little matters, that same mayor has been recalled, leaving the last laugh resting gently on the honest face of ex-Police Commissioner Emmons.

WELL, whether or not you believe in the benefits of endurance flights, you certainly have to hand it to those Hunter boys for their courage and determination. In a way, an endurance flight is like a dance marathon, a rock-chair endurance contest, or a flag-pole sitting derby—about the hardest battle the contestants have is with monotony. In fact, it takes bachelors to stand it. Married men are already so worn down that they haven't the stamina necessary to take on any more monotony in the air. Of course, the fact that they have a legitimate excuse for staying away from home every night for a month might sustain them were it not for the unfortunate condition that they're not going any place. Besides, their wives can keep an eye on them most of the time, and even when she falls asleep the reporters will keep tabs for her and report faithfully what, if anything, goes on. An endurance flier has less privacy than the denizens of the New York Aquarium, where they at least put the crowds out at night.

There's one noticeable thing about endurance flights—they're impossible for Scotchmen. No Scot has the heart to burn up that much gas and oil. Scotchmen can't even bear to buck head winds. There was one Scotch pilot who waited for a tail wind to fly from New York to Chicago. He was last seen passing Bellefonte, hitch-hiking.

It seems strange to me that all these endurance records have been piled up by Americans. I don't know whether they have more determination than foreign pilots or whether it's just that since the Drys got control of the situation in the United States that there's less inducement to land. But perhaps these Hunter boys took it on for Safety First reasons. You consider a man living in Chicago—he's a lot safer in the air, or he is until the gangsters get to using anti-aircraft guns. Even at that he's safer, unless the gangsters hire better gunners than the Army and Navy ever have been able to get. And as for parking your plane in a hangar at the Chicago Municipal Airport, you're more apt to have it if you keep it in the air all the time. So the fire insurance companies tell me.

But I was speaking about the courage and

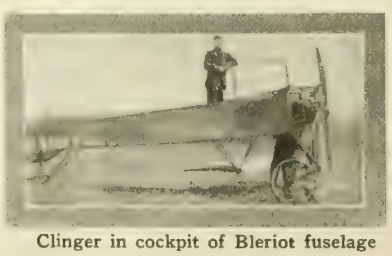


Albert and Walter Hunter

dogged persistence of the Hunter brothers on their endurance flight. A refueling contact in smooth air on a fine day may be simple enough, but you sit down and look ahead to performing that feat some 200 times in all sorts of weather, day and night, and you are looking at enough to bid most of us pause and reflect—and stay down. It takes courage and a calculating eye and a steady hand, not only once but time after time after time. Then there are the simple matters of walking around the engine on a bit of pipe, and sliding along the fuselage to the tail to pick out pieces of papers and string that have lodged there—and all this without the comforting assurance of a parachute on your back! Not for me, folks. I'm not only too old; I always was too old. I'm content to read about it or listen to it over the radio.

You've probably read all about these Hunter boys, but I'll just put in a few words about them here. They came from Egypt—not the Egypt where Pharoah's daughter laughingly declared that she had found Moses in the bullrushes, while Pharoah said, "Oh yeah?"—but Egypt, that part of Southern Illinois named after the land of the Nile. They were born on a farm near Sparta, Ill., and waited there several years for farm relief. It failed to arrive. Then they went down a coal mine and dug coal for a spell. So you can see that with a start like that a mere endurance flight was practically nothing to them. After farming and mining it was a real rest. They could at least sit down while they worked.

All of the boys rode motorcycles and raced automobiles, which so unsettled them that they were ready for aviation. They bought their first plane, an old Standard, with money they had earned on the farm and down the mine, which is about the hardest earned money in the world. Walter learned to fly, and ferried the plane back from St. Louis. Then they did barnstorming, with Walter and Albert piloting and Kenneth doing wing walking. This was excellent practice for him when it came time for him to crawl around that Whirlwind on the Stinson-Detroiter while John flew it. Walter and Albert, as you know, flew the refueling plane. Even that was easier than barnstorming, and much easier than farming or mining.



Clinger in cockpit of Bleriot fuselage

In fact, looking back on their early labors, the boys feel they've got all this money for practically no effort at all. Walter is even reported as saying, "We won't accept money unless we think we've really earned it. A cigarette company offered $10,000 if Junior Kenneth would have a picture taken holding a package of a certain kind of cigarettes. Lindbergh didn't take that kind of money, and we aren't going to, either." Tck! Tck! I fear the strain has told on Walter. I hope he remembers in time that fame is fleeting, but $10,000 can last quite a while.

As I think back over the numbers of pilots who have done endurance flights I'm not so much surprised at their endurance as I am at the financial endurance of the people who have put up the prizes. I think that's the endurance that's going to cave in first. Until it does, we'll be treated to a continual procession of airplanes, engines and pilots in process of being worn out.

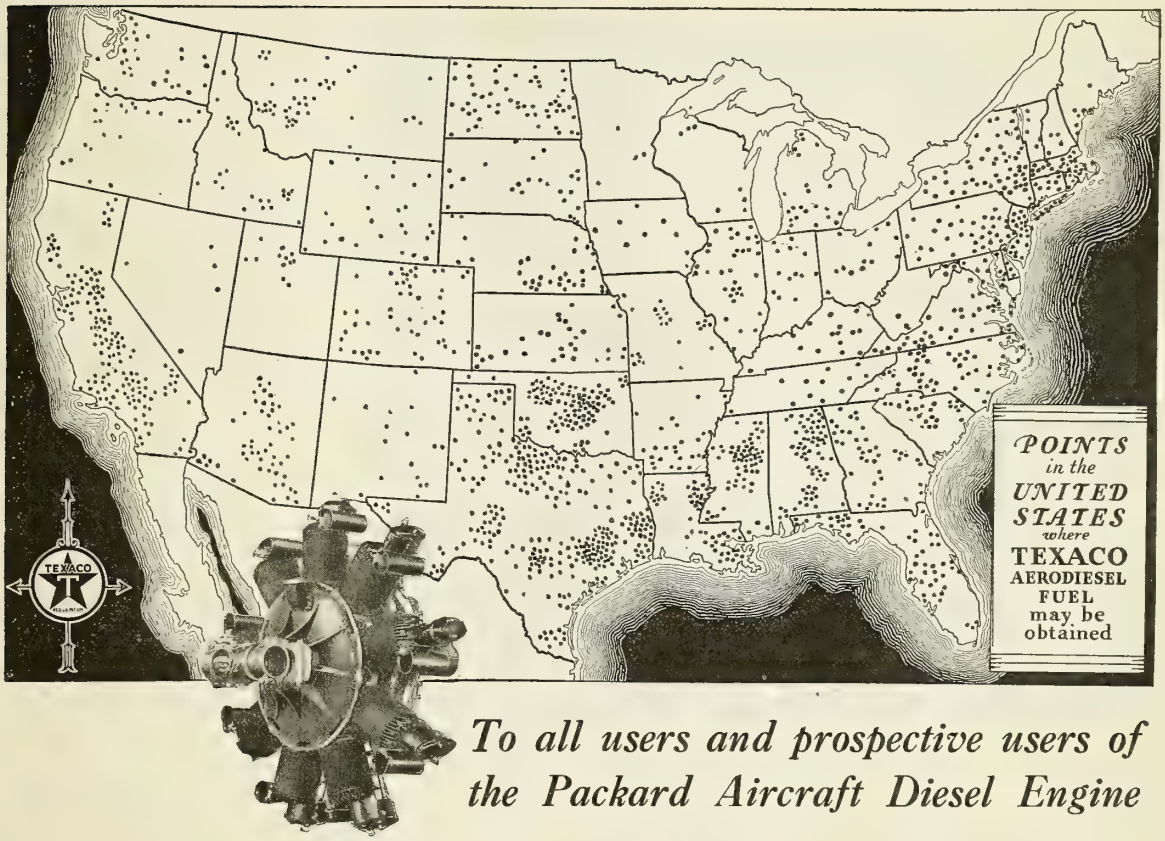
I have a hunch, however, that it's going to be some time before this last record is surpassed. Those four tough old boys from the farm are going to be hard to beat.

AN EARLY BIRD

W. R. CLINGER was one of the first barnstormers, when in 1915 he entered the "Famous Flying School of Aviation" at Joliet, Ill., and was instructed by W. J. Carr, and in three months was out on the road with the American Airplane Exhibition Company of Humboldt, Texas. "I finished the season with little flying and lots of repairing, for it seemed that every place I tried to fly someone had planted a tree, set a telephone pole, or put up a fence." This condition still applies, especially around airports. In fact, they've improved the situation now by adding to the list high tension lines and radio towers.

Clinger had started in aviation in 1911 by building models and kites, and in 1913 constructed a glider which promptly crashed after a few hops. In 1914 he donated yet another glider to the crash heap, and then learned to fly with the aid of the whirling prop. During 1916 he rebuilt a Blériot monoplane which was too heavy for the engine—or the engine was too light for the plane, whichever you like. It only just flew. In 1917 Clinger worked for Thomas Morse company in its factory, then quit to fly with the American Airplane Company for a few weeks. He could not qualify physically for the Army Air Service, so battled the Kaiser as a machinist with the Engineers.

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TEXACO AERODIESEL FUEL



To all users and prospective users of the Packard Aircraft Diesel Engine

The Texas Company has arranged a coast-to-coast distribution of TEXACO AERODIESEL FUEL. This highly effective fuel for the Packard Aircraft Diesel Engine is now conveniently available at, or near, all the principal airports of the country. As the use of the aircraft Diesel increases, the distribution of TEXACO AERODIESEL FUEL will be extended to include every flying field in the United States. The unparalleled chain of Texaco wholesale stations in each of our 48 States has made this possible. • Special arrangements for adequate fuel supplies, wherever necessary, will gladly be made for pilots advising The Texas Company in advance of proposed new routes. Write, or 'phone The Texas Company.

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AIRPORT AND AIRWAY

News of airlines, airports, and airways; radio, lighting and other auxiliary services

By

Kent Sagendorph

Air Travel and the Business Slump

WHILE railroads in all parts of the country are experiencing a serious falling off in traffic volume, the airlines of the country are carrying more and more passengers every month, operating on ever increasing frequency of schedule and effecting more and more operating efficiencies. All of the numerous air transport companies which send regular traffic reports to this office show gains in traffic for the first six months of 1930, amounting in some cases to several hundred per cent. All these companies are accumulating a wealth of experience in the technique of passenger air transport, enabling them to maintain a lower fare than last year, reduce operating expenses and at the same time install expensive radio equipment and maintain a higher safety record than ever before.

Thus we have conclusive proof that the air transport industry is not being visibly affected by the nation-wide business slump. T.A.T.-Maddux and the American Airways have raised fares about one cent per passenger mile, and one or two companies have abandoned the expensive motor coaches between city and airport. These are the only instances of increases in the cost of air travel to the passenger. The trend has been decidedly in the opposite direction, in spite of stock fluctuations, general business depression and unstable financial times.

One or two instances can be mentioned to indicate the attitude of the various companies toward the situation. T.A.T.-Maddux has been in operation approximately one year, and figures are available for its first annual report; a vivid comparison between the last six months of 1929 and the first six months of 1930. During the former period, the line carried 4,436 passengers, as compared with 24,907 for the latter period. The fare, which was originally $388.10, or sixteen cents per passenger mile, was reduced twice and readjusteed upward once, being at present $176.43, or about seven cents per passenger mile. The increase in passenger traffic has allowed the company to establish a complicated radio communications system without making an appreciable increase in the fare.

Col. Charles A. Lindbergh, speaking for the company, said that the number of passengers who had used the line "indicates the desire of the American people for dependable air transporation," and that the next step forward would be to establish an all-air system from coast to coast with passengers sleeping aboard the planes.

President C. S. (Casey) Jones of Curtiss-Wright Flying Service thinks that his company will do twice as much business in 1930 as it did in 1929, as indicated by reports from his numerous fields for the first six months of the year.

"The public is taking to the air as never before," he said. "In the first six months of 1930 we carried 83,259 paid passengers, as compared with 86,589 in the entire twelve months of 1929. Patronage has increased steadily month by month."

Stout Air Lines, operating the Cleveland-Detroit-Chicago passenger system, declared that the first six months of 1930 showed more than a hundred per cent increase over the last six months of 1929. From January 1st to June 30th, planes of the line flew a total distance of 333,497 miles, as compared to 157,996 miles for July to December of 1929.

Various other instances, notably Southwest Air Fast Express, could be cited. All of them quote increases from one hundred to three hundred per cent. At the same time, traffic volume of the C., M. & St. P., Santa Fe, Northern Pacific and several other railroads all showed losses for the corresponding period.

It may be that the airlines are, because of their youth, growing so fast that a comparison with the railroads is not reliable. The rail lines, established in most cases for seventy-five years or more, do not anticipate a startling increase in traffic from one semi-annual report to another. The airlines, apparently, not only anticipate it but are actually realizing it.

Continuing with Colonel Lindbergh's cautious statement that the airlines were "indicating the desire of the American people for dependable air transportation," we believe that the airlines are beginning to create their own clientele; cater to the mass instead of the minority, operate as dependably as most other forms of transportation and give the passenger more for his money than any other. If this is the explanation of the figures on the recent semi-annual traffic reports, no financial or business slump, no matter how pronounced, will affect the ever-rising tide of passengers now thronging to the ticket offices of America's airlines.

Buy An Air Mail Stamp, Mister?

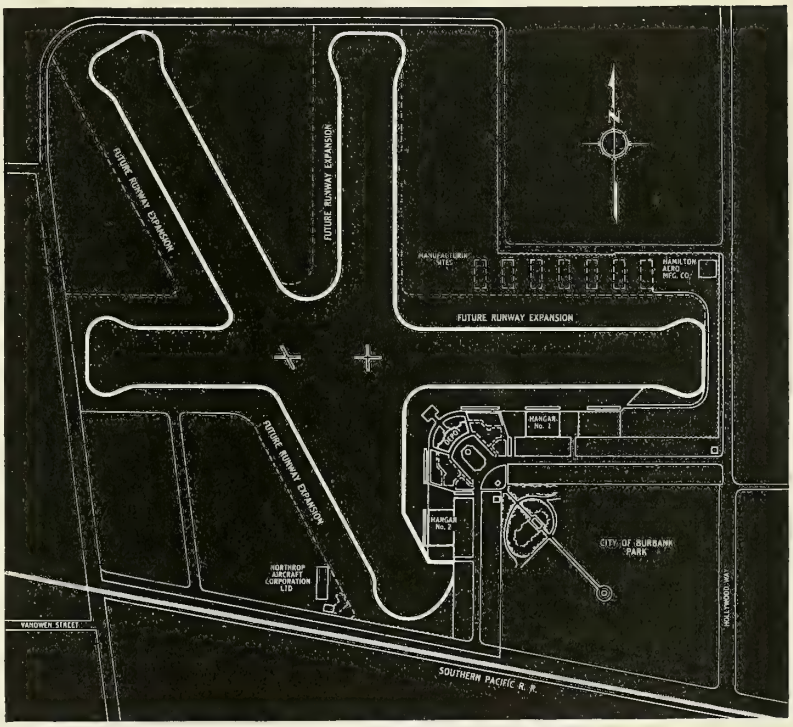
CRITICISM of the air mail has come from sundry and strange quarters, but it remained for an editor in Louisville, Kentucky, to add the final touch to everything that has been said heretofore. He believes that there are too many persons who do not know just what advantages the air mail service can give to them. He tells his readers that it performs functions that "the telegraph and telephone cannot possibly perform," and lists a few of them.

(*Continued on next page*)



Building to serve as clubhouse for the Aero Club of California, as it will appear when fully equipped

It is the FIRST STEP *that* COUNTS



Careful emphasis on future expansion marks the layout of the United Airport of the Boeing System at Burbank, California, now one of the world's finest airports. The entire project was designed and constructed by Austin Engineers

The time to insure the success of your airport venture is at the very outset. For its conception and layout either point the way to future growth, or rapid obsolescence. Plans should be carefully prepared by the best talent available, for good engineering is worth many times its cost.

By enlisting Austin's Airport Engineers for your problem . . . whether it be a single hangar, an aircraft plant, terminal buildings, runways, or complete airport . . . you gain the accumulated experience of men who pioneered in this phase of an industry now of age. They serve present problems in terms of future development and past experience—through aviation projects in 38 cities, 22 states.

Under the Austin Plan of Undivided Responsibility the entire burden of the project is taken from your shoulders. Your project is handled complete from preliminary survey to the finished airport . . . a single contract covers design, construction and building equipment; guarantees total cost, quality of workmanship and materials, as well as a definite completion date. A bonus and penalty clause is included if desired.

Let the first step of your airport development be an Austin Site Selection, Survey, and Report . . . it will safeguard future usefulness of present facilities, and will help gain favorable consideration for any necessary financing of your project. Phone, wire, write the nearest Austin Office, or use the convenient memo below.

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New York Chicago Philadelphia Newark Detroit Cincinnati Pittsburgh St. Louis Seattle
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The Austin Company of Texas: Dallas The Austin Company of Canada, Limited

THE AUSTIN METHOD

USE THE AIR SERVICE

Memo to The Austin Company, Cleveland—We are interested in ☐ Airport (Municipal) (Private) containing _____ acres. ☐ Hangar _____ x _____
with _____ ft. clearance. ☐ Factory approx. _____ sq. ft. Send copy of "Airports and Aviation Buildings." Name _____
Position _____ Firm _____ City _____ A D 8-30

(*Continued from preceding page*)

But, says he, the air mail contractors are poor business men and are backward about advertising their wares; telling the populace just what services they can perform. Just why this should be so, he does not know. One reason, perhaps, is that the air mail contractors are "aeronautical enthusiasts" instead of merchandising, advertising and selling experts. "The part which is incomprehensible," he remarks, "is that the great aviation companies have on their boards first-rate business men."

He believes that the industry is leaning heavily on a public goodwill which it does not merit by its own effort. The public is asked to patronize air mail on the ground that it will bring better service from the Government. This argument, says he, is spacious and disingenious."

Why do not air mail contractors advertise widely, engage in publicity campaigns and stimulate public interest in their own individual run? Why do they bask in the reflected publicity concerning Postmaster General Brown and the Watres Bill?

Air mail contractors, as a rule, we believe, have very little to gain by advertising their organization. If a citizen of Seattle, for instance, saw a huge electric sign on a downtown building flashing: "Varney Air Lines—the Biggest, Best and Fastest, In Fact the Only Air Mail Line to Salt Lake City! Write a Letter to Salt Lake City!" would he be straightaway seized with enthusiasm and write a letter to Salt Lake City? Not in very large numbers.

The best way, it seems to me, for an air mail company to advertise its service is to carry all the mail the Government gives it, safely, swiftly and dependably. A year of perfect operation will do more to build up public confidence than a whole army of publicity men. The average user of the air mail does not know which contractors carry his letter and is not interested in them as individual firms. He wants his letter to get to its destination as rapidly as possible, and he depends on the Government which sold him the stamp to place it with an operator who will achieve this result. Advertising the individual companies which perform this service might be a boon to newspaper editors who have space to sell, but not to citizens who merely want to insure the safe and swift arrival of letters at their destinations.

Empire-Building Airlines

THE late James J. Hill, "empire-builder of the Northwest," had a vision forty years ago of a complete transportation system tapping the untold wealth of the rugged Northwest, from Minneapolis to Seattle. His railroad systems were kept out of politics and Wall Street as long as he lived, to be devoted entirely to the welfare of the then frontier states, founding and building cities, carrying carloads of grain eastward and trainloads of settlers westward.

Just as the first transcontinental rail line ran from Chicago to San Francisco, the first transcontinental airway followed the same route, carrying air mail. Later passenger air transport over the long open stretches of the Northwest was inaugurated by Boeing. And now the Mamer Air Transport, Inc., has inaugurated daily passenger service on its Twin Cities-Spokane-Seattle division.

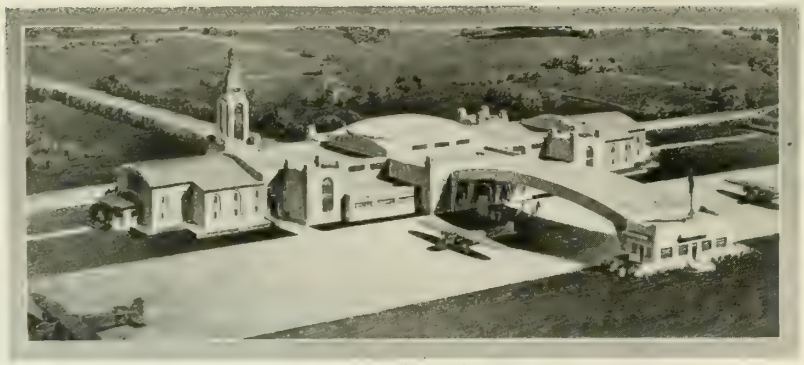
This traffic artery has been under consideration and survey for many months, while its operating difficulties and traffic possibilities are being analyzed. As it now exists, it is not a direct, all-air service between Chicago and Seattle; it is primarily a short-haul line operating between medium-sized cities along the line. It has invaded an entirely new district where no airline has been before, and evidently plans to follow Hill's policy of building up a special traffic which is not available to other airline systems.

Ford trimotors are used on the line. Leaving St. Paul Municipal Airport at 7:45 a.m., stops are made at Minneapolis, Aberdeen, South Dakota, Miles City, Billings, Butte and Missoula, Montana; and Spokane, Wenatchee and Seattle, Washington. Fare from the Twin Cities to Spokane is $97.50; to Seattle, $103.39.

Thus Chicago and Seattle have their first airline connection, through an agreement with Northwest Airways, which carries passengers from Chicago directly to the Mamer hangar. It is in no sense a competitor of the forthcoming Boeing passenger line between the same two points. Boeing will doubtless handle much of the through traffic, and Mamer will continue to make the local stops along its thousand-mile prairie airway.

Boeing has recently obtained control of the Varney line through a stock transfer, and its last hook-up is completed, paving the way for an early inauguration of its transcontinental passenger service. Varney planes operate from Salt Lake City to Seattle, Portland and Spokane, and thus, including a schedule agreement with Western Air Express, Boeing can promise a passenger at Chicago a swift twenty-hour trip to *any city* on the Pacific Coast, from San Diego to Seattle.

With this super-complete Boeing line in operation, Chicago will become the greatest air terminal point on the U. S. map; lines branching out to the Twin Cities, Salt Lake and San Francisco, Kansas City and St. Louis, and also directly southward through Indianapolis via Chattanooga to the South.



Pan American Airways terminal building being constructed at Mexico City

AIR MAIL NOTES

N.A.T. Moves to Newark

BY moving its facilities for handling air mail and express from Hadley Field, New Brunswick, N. J., to Newark Airport, officials of the National Air Transport estimate that deliveries and changes can be speeded up an hour or more. Negotiations are now in progress between Lester D. Seymour, vice president and general manager of N.A.T., and Newark Airport officials.

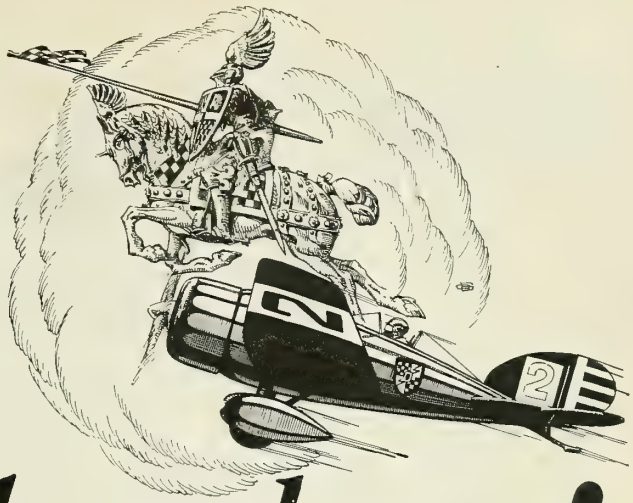
The removal of the N.A.T. mail terminus to Newark will go a long way toward reducing the transportation time of air mail from postoffice to field, which has been a subject of much criticism in the past. It will save at least an hour over the present time required to ferry mail from the distant airport at New Brunswick and the downtown terminal points in New York City.

It is rumored that the transfer will be made as soon as a large hangar is completed at Newark Airport and certain improvements have been made. A new station building will be constructed with a view to future passenger traffic between New York and Chicago over the much-discussed seven-hour line.

N.A.T. inherited Hadley Field from the Government when it took over the old mail line which the Post Office Department had been operating to Chicago. At that time there was no field nearer New York with adequate equipment and space enough to accommodate heavy planes with no wheel brakes. Both N.A.T. and Pitcairn, now Eastern Air Transport, began operations at this obsolete airport, and now that the facilities of Newark are superior and its location far better, both of them are about to desert it. An important factor in the decision was doubtless the wheel-like radio antenna of the Radio Corporation of America, radiating from a central point and mounted on sixty-foot towers which have been the downfall of more than one pilot, literally and figuratively. A beacon was recently installed to guide unwary pilots, and in addition the field has one of the most complete radio, weather and radio-beacon services of any field in the country.

The imminent inauguration of the passenger service, however, made it necessray to locate at the nearer terminal. Operations will begin there early in the fall.

(*Continued on next page*)



Knighthood a'wing!

WITH the dash, daring and genius of a Knighthood that rides the skies, the 1930 National Air Races will unfurl the banner of aeronautical progress.

This year, more than ever, the races will be the gathering place for everyone in aviation. There will congregate the old timers and the new students, the executives and employees. There will be the world-famous Knights and Ladies of the Air, and the unsung, but vitally important, "grease monkey." There will be new ships, new motors, new instruments—and there will be made new fame by men and women pilots from all parts of the world.

Come, enter, profit, and enjoy yourself at the most colorful classic of the sky—*and Come-A-Flying!*

$100,000.00
IN CASH

and many valuable trophies will be distributed. If you have not received your copy of the "Schedule of Events and Prizes," and information on hotel reservations, etc., write for it now. Address, Cliff W. Henderson, General Manager, National Air Races, Hotel Sherman, Chicago.

NATIONAL AIR RACES

August 23 to September 1, 1930

CURTISS-REYNOLDS AIRPORT—CHICAGO

(*Continued from preceding page*)

Air Mail Grows in South America

IN a statement made in connection with the recent flight of Col. Fierro, non-stop from New York to Mexico City, Assistant Postmaster General W. Irving Glover took occasion to mention the phenomenal growth of air mail volume on lines running between the United States and Central and South American countries.

The greatest increase reported recently is on the route from Miami to Puerto Cabello, Venezuela, on which the poundage of air mail has increased eighty-three per cent from January to May, 1930. On the long route between Cristobal and Montevideo, Uruguay, the rate of increase was sixty-one per cent for the corresponding period. The third largest increase was the route from Miami to San Juan and Paramaribo, Dutch Giaana, on which the recorded increase was twenty per cent.

These lines are operated Pan American and New York, Rio and Buenos Aires lines.

Change on C.A.M. 8.

CONTRACT Air Mail Route No. 8, operated by Pacific Air Transport between Seattle and Los Angeles, was extended as of July 1st to include San Diego, California. No change is made in the existing schedule, one trip daily being made in each direction.

June Poundage Increases

THE total number of pounds of air mail carried during the month of June, 1930, was 680,660, a decrease of 6,393 pounds below the May total. The daily average, however, was greater because of the fact that there was an additional day in May.

The daily average for May was 26,425; for June, 27,226.

Boeing led the list with the huge total of 159,309 pounds of mail carried between Chicago and San Francisco. N.A.T. was second with 152,484 pounds carried between New York and Chicago. This figure was a new record for N.A.T., its previous high mark having been 142,396 pounds carried in May.

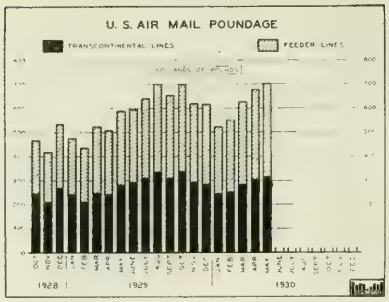
Expensive Postage

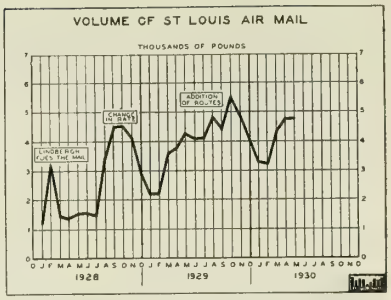
ANNOUNCEMENT was made recently by W. Irving Glover that additional air mail lines would be in operation soon between the United States and South America. A service line from Paramaribo to Sao Paulo and Rio de Janeiro will be added to the present list, making the U. S. Post Office Department the proud foster-father of a complete system which encircles the whole continent of South America.

Explanation for the expansion of the service, which also includes additional trips on existing routes and the change from weekly to twice weekly round trips, was given as the marked increase in air mail cargoes and the public demand for greater frequency of service.

Two instances were given of the service rendered to American manufacturing firms. In one case when smallpox vaccine was urgently needed in Costa Rica, a banana republic on the northern border of the Canal Zone, President Ernesto Quiros Aguilar sent a rush order to an Indianapolis supply house. The vaccine was shipped the same afternoon and flew to Chicago, thence to Atlanta, Miami and Puntarenas, Costa Rica. The postage was $851.20. Five days were required to make the trip.

Another instance was a shipment of mining machinery parts from a city in Ohio to a mine in Chile. The postage on this shipment was $580. The mining firm said that this was a considerable sum to spend for postage, but a great improvement over a lengthy shut-down awaiting the arrival of a steamer.





Graph of U. S. air mail carried October, 1928, to May, 1930; (right) volume of mail from St. Louis as a representative city

AIRPORT AND AIRWAY DEVELOPMENTS

Notices To Pilots

FIELDS IN POOR CONDITION: Fayetteville, North Carolina (Fort Bragg). For the next thirty days workmen and machines are obstructing the free use of the field while night-lighting equipment is being installed. Covered by Airway Bulletin No. 356; U. S. Air Corps Maps 16 and 18.

Hebron, Maryland. Located north of the city, has been closed until further notice. The field, which is still available, has no facilities of any sort. Pilots are warned to use discretion when landing, because of the high growth of grass. Covered by Airway Bulletin No. 618; Hydrographic Office Aviation Chart V-233.

Olympia, Washington. Olympia Airport. Use this field for emergency landings only; developments are under way here and the field is in poor condition. Airway Bulletin No. 539 cancelled.

FIELDS DISCONTINUED; BULLETINS CANCELLED: Saugus, Mass., Groah Field; cancel Airway Bulletin No. 8; field dangerous to land on.

Rochester, N. Y., Rouse Partridge Field; discontinued; Bulletin No. 529 cancelled.

New Castle, Pa., Jackson Field; discontinued; Bulletin No. 519 cancelled.

Lemoyne, Pa., Steinhauer Airport; cancel Bulletin No. 395.

Sharon, Pa., American Eagle Airport; cancel Bulletin No. 443.

Butte, Montana, National Airport; pilots are warned not to use this field, four miles south of town; use the municipal airport; cancel Bulletin No. 753.

Dayton, Ohio, Moraine Field, four miles south of Dayton; discontinued; cancel Airway Bulletin No. 171.

LANDING FIELDS ESTABLISHED: Islip, Long Island, N. Y., one mile north of city; name ISLIP on building in city; position: 40° 45″ north, 73° 13″ west.

Dunedin, Florida: Skyport Field, one mile north; hangar, supplies and transportation to city: position: 40° 02′ 24′ N., 82° 47″ W.

Vero Beach, Florida; emergency field, Silvertown Airport.

NEW SEAPLANE ANCHORAGE: Barnstable, Mass; located in the cove on the eastern shore of Mystic Lane, southwest of Cape Cod Airport; landing and take-off area, Mystic Lake, seven-eighths by one-half mile; good shelter; average depth ten feet, sand and gravel bottom; a three-acre island forms an obstruction; fuel and oil available; has been used by large Navy seaplanes; position 41° 40″ 45′ north, 70° 25″ west.

New Airway Bulletins Published

Location of Airport	*Bulletin No.*
Vail Field, Los Angeles, California (Revised)	82
Dudley, Massachusetts (Revised)	126
Aero Corporation Field, Los Angeles, California (2d Revision)	173
El Monte, California (Revised)	387
Oconomowoc, Wisconsin	552
Pinehurst-Southern Pines, North Carolina	673
Lehighton, Pennsylvania	691
Casa Grande, Arizona	970
Brinkley, Arkansas	971
Western Air Express, Alhambra, California	972
Wood River, Illinois	973
Manhattan, Kansas	974
Owensboro, Kentucky	975
Bay Minette, Alabama	984
Holbrook, Arizona	985
Eureka, California	986
Cary, Illinois	987
Sarasota, Florida	988
Centralia, Illinois	989
Fredonia, Kansas	990
Texarkana, Arkansas-Texas	991
Safford, Arizona	992
Arcadia, Florida	993
St. Ignace, Michigan	994
Springfield, Oregon	995
Waycross, Georgia	996
Northampton, Massachusetts	997
Hachita, New Mexico	998
Winchester, Virginia	999
Belgrade, Montana	1000
Bay City, Michigan	1001
Charlottesville, Virginia	1002

(*Continued on next page*)

Another Move FORWARD!



GOODRICH pioneers and perfects low pressure BALLOON TIRES for airplanes of EVERY TYPE . . .

Distinct Advantages of Goodrich Balloon Tires for Airplanes

1. Safer landings in soft fields
2. Adequate braking
3. Adequate wheel diameter
4. Materially increased comfort in taxi-ing
5. Decreased wear and tear on planes
6. Low pressure tires to fit present axles
7. Can be changed over in minimum time
8. Endorsed by leading operators after actual test

SURER FLYING . . . safer take-offs . . . freedom from the hazards of emergency landings on soft and muddy ground . . . a great step forward toward foolproof aviation . . . that's why planes of every size, type and description are being changed over to Goodrich Low Pressure Balloons.

That's why this new tire—pioneered and perfected by Goodrich—is pronounced as revolutionary in principle as the balloon tire was for the automobile.

Goodrich Airplane Balloons have a relatively small wheel diameter, large cross section, and carry a very low pressure, giving phenomenal cushion and protection to planes on take-offs and landings. Engineers state that it is practically impossible for a plane to ground-loop when equipped with Goodrich Balloons and that they keep a speeding plane in contact with the earth, when taking off, until it has gained sufficient flying speed to take the air safely.

Remember—Goodrich Low Pressure Airplane Tires are made for planes *with* or *without* brakes. They are for sale at all leading airports.

The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Company, Kitchener, Ont.

Goodrich

BALLOON TIRES FOR AIRPLANES

another B.F. Goodrich Product

Over 40 rubber articles for airplanes . Silvertown Tires . Tail Wheels . Streamline Windshields . Hose . Tubing . Engine Mounts . Crash Pads . Accessories

(*Continued from preceding page*)

Licensed Airports in Michigan

WORD has been received from the Secretary of the State of Michigan that under the state law governing aeronautics, sixty-seven airports have been granted state licenses by Capt. Ray Collins, director of aeronautics. Since the requirements for this type of license differs little from Federal airport requirements, the state offers a good many well-equipped and serviceable airports. The list, with description of each, may be had upon application to Capt. Ray Collins, Lansing, Michigan.

Traffic Division of International Airports Corporation

THE International Airports Corporation, New York City, has established a traffic division for the convenience of airline passengers and others who desire up-to-the-minute information concerning fares, schedules and details on any airline in the North American continent. Special charter trips have been arranged recently upon request, and reservations made with many airlines in all parts of the country. This is in addition to the firm's usual service in airport construction, design and management.

Hotel For Ford Airport

A MODERN hotel to accommodate 150 guests will be erected at the Ford Airport, Dearborn, Mich., within the near future, according to advices received recently. Contracts have been awarded, and the work will begin shortly.

The exterior of the building will follow American colonial design to harmonize with Ford's museum, nearby. The lobby, also treated in the colonial manner, will be approached through an arcade extending across the front of the main building, between two projecting wings. A main dining room, lunch room, 109 guest rooms, each with bath, and other conveniences are to be provided. The structure will be erected 300 feet back of Oakman Boulevard, in an unusual setting of privacy and quiet.

The management of the hotel has not been announced. Airports all over the country will await the final announcement of policy at the new hostelry with eagerness, in view of the well-known Ford policy of economy and specialization. Ford owns a large hospital near Detroit which has been the subject of considerable criticism from the medical fraternity because of the "mass production" methods alleged to be in force there. As far as is publicly known, this is Ford's first venture into the hotel business.

Aviation Maps for Central America

TWO new aviation charts of sections of Central America, over which the majority of America-Panama traffic passes, are ready for distribution by the Hydrographic Office, Navy Department.

Officially designated as 404 and 246a, the maps cover short routes which can be followed to connect the eastern and western routes leading from the United States to Central and South America. The first is a chart of the sections of Nicaragua and Honduras between Managua and Tela; the second represents parts of Mexico beetween Salina Cruz on the Pacific Coast and Puerto Mexico, a Gulf of Mexico port. These two short routes are important connections between the Pacific and Atlantic routes ordinarily followed. The charts are priced at forty cents each and may be had from the Hydrographic Office, Navy Department, Washington, D. C.

Curtiss-Wright Field at Valley Stream Nearing Completion

WITH the announcement that construction is nearly completed at the Curtiss-Wright Airport, Valley Stream, Long Island, officials of the organization point to the improvements made at the field in the year that construction has been in progress.

Last June the airport was merely a dusty open clearing, and every plane landing there produced such irritating clouds of choking brown dust that it was nicknamed by the pilots "the Great Sahara Desert." Today the dust problem has been solved by the construction of surfaced runways and the treatment of the remaining surface to prevent the dust from rising.

The restaurant, recently completed, is now in daily use. In addition, seven hangars have been completed along the edge of the field. On the other side of the field is the training hangar used by the Naval Reserve unit under Lieutenant Whitehead. The field has one of the most complete lighting units in the country, as well as a tile draining system. [The airport shown on the front cover of this issue is the Curtiss Valley Stream field.—Editor.]

NEW COMPANIES AND MERGERS

Aeronautical Radio, Inc.

IN order to standardize and centralize radio services to the airlines, air mail contractors and airway pilots, a non-profit organization known as Aeronautical Radio, Inc., supported by all the airlines in the country, has lately come into being as a common enterprise to stimulate the use of radio by all branches of aircraft.

Represented in the company are Western Air Express, Boeing, all lines of the American Airways, Pan American Airways and Curtiss-Wright Flying Service, as well as numerous other smaller systems. National Air Transport, T.A.T.-Maddux, S.A.F.E. and Eastern Air Transport are expected to join the organization soon.

President of the company is Herbert Hoover, Jr., formerly radio engineer for Western Air Express, lately made chief engineer of the company; radio editor and monthly contributor to AERO DIGEST.

Other officers are Paul Goldsborough, executive vice president, who will handle a great share of the actual executive work from his office in Washington; Thorp Hiscock of Boeing Air Transport, vice president; and H. C. Leutertitz of Pan American Airways, secretary-treasurer.

Each line leases its ground equipment to Aeronautical Radio, Inc., for operation, and each, in turn, contributes a *pro rata* share of the usual maintenance cost. At large transport terminals like Chicago, Tulsa and Kansas City, the ground stations now maintained by the separate companies will be merged into a single unit, thus avoiding the present duplication.

The organization hopes to simplify the present confusion in radio practice by the several transport companies and operate aircraft radio much like the Radio Corporation operates American marine radio and the British Marconi Company serves the British merchant ships.

The Varney-United Merger

NEWS that United Aircraft and Transport had obtained control of Varney Air Lines will not surprise those readers of this section who have been following developments in the western part of the country. As soon as Boeing's Chicago-to-the-Coast line was projected, the Varney system, one of the oldest and most successful in the country, became a highly-prized pawn in the game of a complete United Aircraft service from coast to coast. Varney has been operating a strictly air mail service from Salt Lake City to Pasco, Washington, with a recent extension to Spokane, Seattle and Portland. Varney's Stearman Speedmails and Super-Speedmails are in the air every hour of the day and night, varying from five of them at various parts of the Salt Lake City-Pasco route in the afternoon to a single, lone ship winging its way along the airway at three in the morning.

When the line entered the passenger field following the passage of the Watres bill, every facility except the ticket booth was already in operation. Varney's long experience as a pioneer flier, salesman, school operator and mail contractor gave him a wide advantage as a passenger line operator over a newcomer. Since it was imperative that the United be enabled to transfer

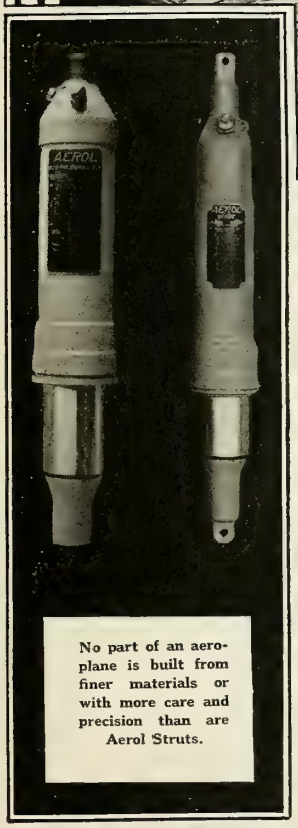
(*Continued on next page*)



Modern hotel of colonial design to be erected opposite Ford Airport, Dearborn, Mich.

Changing Emergency Landings from Crises to Incidents . . .





No part of an aeroplane is built from finer materials or with more care and precision than are Aerol Struts.

THE increased acceptance of flying rests upon better control of the plane while being landed under emergency conditions.

Such performance depends upon the plane's minimum flying speed and its landing gear. Manufacturers owe it to their future and to the pilot and the flying public to give their planes maximum landing performance.

That is why an increasingly large group of plane manufacturers have standardized on Aerol Oleo-Pneumatic Landing Struts. Their presence under the plane changes the vast majority of emergency landings from crises to incidents and establishes unequaled confidence on the part of the pilot.

The telescoping action of these powerful and efficient cylinders absorbs initial impact, eliminates "crow-hopping" and shortens the roll.

Aerol Struts are made in the Military Type of extreme service and the commercial type for ordinary operation. Complete information will gladly be sent on request.

Aerol Struts are manufactured by The Cleveland Pneumatic Tool Company, Cleveland, Ohio.

ASK THE PILOTS WHO LAND ON THEM

AEROL *shock absorbing* STRUT



The Packard Diesel on this Stinson is being used in service on T. A. C. routes

(*Continued from preceding page*)
its passengers at Salt Lake City for Seattle and the Northwest, the big combine approached Varney and Louis H. Mueller, president of the Varney line, with offers of one share of United stock for two of Varney.

The transfer was a good deal for both parties. United needs the dependable, time-tested features of the Varney line, and Varney might discover times when the financial bulwark of United's huge resources would provide him with a solid backing for his Varney Air Line stock. No changes in schedules will be made until the Boeing passenger line opens.

REGULATING AIR TRAVEL

Air Marking Compulsory in Ohio

OHIO has the first mandatory municipal air-marking law in the world, embodied in the general code, section 6310-44, according to a report prepared by the director of aeronautics in Ohio, John M. Vorys. The law provides that each municipality shall be air marked in accordance with the rules and regulations prepared by the director of aeronautics, within sixty days after receiving notification.

Efforts have been made to secure voluntary markings of cities throughout the country by the Department of Commerce and the Guggenheim Fund, as well as by local aviation clubs and chambers of commerce. This mandatory law is the first within recorded experience, but obviously will not be the last to be placed on state and municipal statute books. It specifies the type of marking to be installed, describes airport pointers and meridian indicators and how to check their direction, and what types of structures shall carry the roof markers. The municipalities are to defray the expense.

Reports on Diesel-Powered Planes

AIR transport operators all over the country are watching with interest the results of flight tests and regular everyday use of the Packard Diesel engine, installed on a Thompson Aeronautical Corporation Stinson mail plane. The Diesel-powered craft made its first schedule flight with mail on C.A.M. 27, the Pontiac-Chicago run, on June 24th, and has been in almost daily service ever since.

Fuel consumption on the initial flights averaged fifty gallons of fuel oil per trip, as compared with sixty-five gallons of gasoline burned by conventional engines on the some route. Thompson has stated that if any transport operators or air mail contractors desire information regarding the results of the Diesel engine in everyday use, it will be furnished upon request.

The inaugural Diesel-powered flight marked the millionth mile flown by T.A.C. ships since 1928. The occasion was marked by the removal of the firm's main offices from Kalamazoo to Pontiac. Ralph R. DeVore, who started with Thompson in 1928 as a pilot, was named general service manager; and B. C. Hawkins, formerly DeVore's assistant superintendent at the Pontiac repair depot, became superintendent.

Incidentally, the Cleveland-Detroit amphibion division of T.A.C., is planning to add another round trip to its daily schedule from Cleveland to Detroit, making six round trips on week days and two on Sundays. There are rumors that the firm is planning an amphibion line from Detroit to Chicago, nearly paralleling Stout's airway.

THE PASSENGER LINES

California Escapes Fare Increase

WHILE the rest of the states served by the T.A.T.-Maddux lines were receiving notices of fare increases on the system, California escaped being included. Fares were lowered there, while being raised elsewhere. The local rates from Los Angeles to San Francisco are now at the lowest level in history and provide what is said to be the lowest regularly-scheduled air transport fare in the United States.

The old round-trip fare between Los Angeles and San Francisco was $43; the new is $40.85, which represents a saving of $2.15. A Los Angeles-Fresno two-way ticket which formerly cost $40 is now $38. The Los Angeles-Bakersfield fare for both directions was $20 and is now $19. Los Angeles-San Diego charges, formerly $15, are now $14.73.

The natural result is that the western division of the company reports an increasing number of passengers making the round trip to a California city from Los Angeles "just for the ride." According to H. W. Beck, traffic manager, a decided amount of vacation and non-business travel is noticed since the fare decrease.

This is a healthy situation and where the fare is low enough it ought to be encouraged. As Don Rose said in the July issue of AERO DIGEST, the *pleasure* of air travel is its greatest advantage, even greater than its speed. California, abounding with vacationists, should see more and more purely pleasure traffic, now that the fares are so low that they compare well with motor bus charges.

First Plane Delivered for Hourly Airline

THE first of the new ten-passenger Stinson Airliners, fitted with three Lycoming engines, landed at Newark Airport recently for preliminary tests before the inauguration of the New York, Philadelphia and Washington Airline, scheduled for the latter part of August.

On the trip from Camden Airport, near Philadelphia, a distance of seventy-two miles, the ship made a smooth and comfortable trip in thirty-eight minutes. G. P. Putnam and Eugene Vidal, vice president in charge of traffic, were carried as passengers.

The plane is the first of six to be used by the company on its proposed hourly service between New York City and the capital. During the load tests at Philadelphia, it performed well and climbed with full load on two engines.

Pan American Announces Extension

AN important announcement from J. T. Trippe, president of the Pan American Airways system, explains his company's new additions to its South American and Central American lines and their bearing on the movement of traffic in that immense territory.

A complete new schedule will be in effect; one whole day is cut from the time of a journey from Western United States through Mexico to Panama; air mail across the Caribbean will be approximately doubled; the air mail line will be extended about 3,000 miles from Rio de Janiero to Parimaribo and the total of Pan American mileage on regular schedule will be brought to 18,217.

Taking these features up in order, we discover that the daily passenger service from Brownsville, Texas, to Mexico City has been amplified, the service from Miami to Cristobal has been reduced in price from $395 to $370 and a number of special rate reductions put in effect.

Two-way telegraphic radio will be in operation on all the new extensions. The new line from Rio to Paramaribo will use multi-colored craft, and full meterological service is provided from the ground stations. On a journey of this length, 3,000 miles, weather reporting service cannot be too complete.

The service from Florida to Nassau, which formerly was suspended after the close of the winter hotel season, will be operated regularly each week and daily during the winter.

Instead of leaving Miami for the Carib-

(*Continued on next page*)



The
SOUTHERN CROSS

Five-year old FOKKER tri-motored plane that besting Arctic ice and tropic jungle circumnavigated the globe

THE ROOSEVELT
NEW YORK

2 July, 1930

Dear Tony Fokker,

As the Southern Cross takes off from Roosevelt Field on the great old ship's last long flight, I feel I must express to you once more my lively appreciation of the marvelous flying and lasting qualities of this airplane you built five years ago. They tell me here she could have turned round and flown the Atlantic again within an hour or so after we landed.

I really hate to give her up. But she has well earned honored rest. I hope that she will be placed somewhere to serve as an inspiration to all of us who believe that flying is a thoroughly dependable means of travel. Land plane as she is, she has flown all the world's oceans.

You seem to need no inspiration yourself. When President Hoover was good enough to invite us to the White House we flew down in your latest Fokker, the F-32. And the ship flies beautifully. You have always built planes that flew magnificently. I fought against some of them during the war -- and well I knew them! All of the record flights I have since made were in Fokker planes; so well justified by the safety and durability of the Southern Cross.

Nor can I leave without expressing in behalf of myself and companions our thanks for the generous personal hospitality you have provided for us in New York.

Sincerely yours Charles A. Lindbergh
(Smithy)

There are smaller Fokker planes than the Southern Cross and larger ones. Fokker will gladly demonstrate any model. Fokker Aircraft Corporation, General Motors Building, New York

(*Continued from preceding page*)
bean flights Saturday afternoons, the Pan American amphibions will leave Tuesday and Friday afternoons, proceeding (as Lindbergh did), to Havana that evening and starting the next morning on the 1,420-mile over water flight to Cristobal.

This gives most large cities in the United States twice-weekly seven-day service between New York and Buenos Aires. It carries Pan American planes to every country in the Western Hemisphere excepting Canada, Alaska, Bolivia and Paraguay.

Memphis-Tulsa Line Opens

MEMPHIS, Tennessee, is now connected with a number of large national airways through the recent inauguration of the new Oklahoma Short Line Airways, Inc., service between the Tennessee city and Tulsa Airport.

Service was started June 26th with five Ryan monoplanes, duplicates of the models used on the Robertson line from St. Louis to New Orleans, described in this section recently. One trip per day is made in each direction, with planes leaving Memphis at 8:00 a.m. and arriving at Tulsa at 11:30 a.m. Connection is made at Tulsa with the planes of Southwest Air Fast Express, Universal Air Lines, Western Air Express and T.A.T.-Maddux. Rate of fare was not made public.

The Monthly Statistic

NOT to be outdone by scientists who give figures in terms of people lying end to end from the earth to the moon, Pan American has announced its annual report with highly descriptive phrases.

"Flying a distance equal to 145 times around the earth at the equator," says the report, planes of the line completed a total mileage of 3,522,076. A total of 29,805 passengers were carried. Measured in engine-miles, the totals show 8,381,641 engine miles flown.

"Translated into terms of single-engined endurance flying," continues the report, "the same total would keep a plane in the air eleven years, four months and twenty-seven days. In other words, if the Hunter brothers had gone aloft July 4th to fly that long, they would not have come down until Christmas, 1941."



Truvane illuminated wind "T"

Kohler Aviation Starts Trans-Lake Service, Milwaukee-Muskegon

A WELL-DESIGNED rail-air terminal is now in the process of construction on the lake front at Milwaukee, Wisconsin, according to the Chicago and Northwestern Railway, which will be the transfer point for the new Kohler amphibion service across Lake Michigan, directly connecting with Muskegon, Grand Rapids and other points without the long detour around the lake.

Six-passenger Keystone-Loening amphibions are being used on the line, which makes direct connections with trains of the C. & N. W. The new system cuts several hours from the time of a journey from the East to points along the west shore of Lake Michigan. Dogs and pets are carried when properly crated, but trunks will have to go by rail. Three flights across the lake are made daily in each direction.

Flight Escorts on Stout Planes

THE official chaperon, called on various lines the "conductor", "steward", "courier" and so forth, has been designated as the "escort" on planes of the Stout Air Services, and must henceforth act in that capacity. He must be ready to act as announcer, too, standing at the door of his plane and calling: "Plane leaving for Bat-tle Creek, Kal-a-ma-zoo, South Bend, Chi-ca-go; 'bo-oard!"

In flight he stows passengers' baggage away, looks after their comfort, answers a thousand and one questions regarding the plane's altitude, speed and condition of safety. He stays with the ship at all times, putting the passengers in the bus at the destination and then waiting for a new load for the return trip.

NEW DEVICES AND METHODS

Neon Illuminated Wind "T"

THE illuminated wind "T" in use at United Airport, Burbank, Los Angeles, California, was designed and installed by the TRU-AD Company of Los Angeles, in connection with the Austin Company, builders of the airport.

Besides being very delicately balanced and sensitive to the lightest breezes, its Neon illuminating construction, including four Neon tubes, allows the T to be seen at high altitudes and through fogs. The mechanical and electrical design is such that one tube could blow without influencing the functioning of the remainder.

Its size is twelve by sixteen feet, over all, but the same design is available in smaller sizes for smaller airports and landing fields. This particular model has a special transformer, so that the current from the boundary light circuits could be transformed without any loss of effectiveness in the border-lighting current.

Caterpillar Company Introduces Leaning Wheel Airport Grader

DEVELOPED for heavy service with the Caterpillar "Sixty" tractor, a new grader with a blade that can cut a sixty-degree sloping bank has been announced by the Caterpillar Tractor Company. A new feature is the addition of leaning wheels, so that the blade and frame can tilt at an angle while the wheels remain upright.

This is the fifteenth machine in the company's line of auxiliary tools designed for service with its tractors. The grader weighs 11,300 pounds without scarifier, and introduces a centralized control system by which seven control wheels govern the nine important adjustments of blade pitch and position, wheel adjustment and steering.

It is said to be perhaps the most versatile grader on the market, having a wide range of positions, blade pitch and adjustments and capable of meeting any condition met with in usual grading work. The machine is described fully in a modernistic booklet, procurable by writing to the main office of the Caterpillar Tractor Company, San Leandro, California.



New leaning wheel airport grader developed by the Caterpillar Tractor Co.



send for THIS BOOK!



WHY the T. A. T. is equipped with "Caterpillars" from Ohio to the Coast. Why airports the world 'round are seeking "Caterpillar" traction and sustained power to reduce the cost of airport building and operation—to do more tasks *better, quicker, cheaper.*

These are things this book tells in 20 pages of interesting views of a score or more of economical operations at the world's finest airports.

Prices—f. o. b. Peoria, Illinois

TEN . .	$1100	TWENTY	$1900
FIFTEEN .	$1450	THIRTY .	$2375
SIXTY			$4175

Caterpillar Tractor Co.
PEORIA, ILL. *and* SAN LEANDRO, CALIF., U. S. A.
Track-type Tractors Combines Road Machinery
(There's a "Caterpillar" Dealer Near You)

CATERPILLAR
REG. U.S. PAT. OFF.
TRACTOR

JUST CLIP AND MAIL

*Name*_____

*Address*_____

*City*_____ *State*_____

THE FINEST THREE PLACE BI-PLANE BUILT



THE REARWIN KENROYCE

THE Rearwin Ken-Royce is a three place biplane manufactured for the person who insists upon the best and gets it.

Safety is the paramount thought in designing this ship. Performance of the Ken-Royce is startling. Imagine a plane traveling at 140 miles an hour, and landing at 35. Lands almost like a glider, thus assuring an unusually high safety factor in small or strange field landings.

Even the amateur finds the Ken-Royce remarkably simple to control and land.

Flying the Ken-Royce is like driving the best controlled automobile built.

Service ceiling of over 24,000 feet—it laughs at mountains. Under perfect control at high altitude. Will not spin unless forced by pilot and straightens out when controls are released.

Rearwin oil cushion special shocks permit rough landing with safety.

The Ken-Royce has won many races competing with ships of far greater horse power. It won the National Race from Miami, Florida, to Cleveland last fall. Miss Ruth Nichols chose it for her entrant in the Womans Air Derby. We make the unchallenged claim that the Ken-Royce is the fastest Bi-plane in its class. Over 100 competitive events have proved this statement!

Be sure and write for full details of this remarkable Airplane "which stands unchallenged in over 100 performance tests."

New Price

$6500.00

Anticipated increased production makes possible this new low price, $6500.00 with Continental 165 H.P. engine.

Equipment

The Ken-Royce is equipped with steel propeller and Pioneer instruments including tachometer, oil pressure gauge, oil temperature gauge, altimeter, air speed indicator, compass, Bendix wheels with brakes, Rearwin oil cushion shock absorbers, parachute type seats, navigation lights, and many other features. Colors: fuselage —deep cream; Wings and tail surfaces — International orange; struts and under carriage—black.

Financial Strength

Rearwin Airplanes, Inc., is backed by two men whose personal fortunes exceed the seven figure class.

Dealers

Our dealer proposition is extremely attractive. Get lined up with a winner. Write or wire for full information.

ON DISPLAY IN NEW YORK

A demonstration can be arranged through our Eastern Factory representative, Mr. W. D. Goss. He can be communicated with, care of McAlpin Hotel, New York City.

REARWIN AIRPLANES, INC.

FAIRFAX AIRPORT KANSAS CITY, KANSAS



Fifty-two planes of the Aircraft Squadron Battle Fleet being fueled with Socony Aviation Gasoline at Boston Airport.

52 Battle Planes Fueled with Socony in 2½ Hours

SOCONY officials at Boston Airport made another record for themselves when they fueled 52 planes of the Aircraft Squadron Battle Fleet with 4840 gallons of Socony Aviation Gasoline in two and a half hours.

Uncle Sam's fighting planes must have a gasoline that is entirely dependable. Their selection of Socony Aviation Gasoline is in line with the policy of many airports throughout New York and New England where Socony petroleum products are designated the official fuel.

SOCONY

AVIATION GASOLINE · AIRCRAFT OIL

STANDARD OIL COMPANY OF NEW YORK

THE AIR SERVICES

THE NAVAL AIRCRAFT PROGRAM

THE Five-Year Aircraft Building Program of the Navy Department will be completed by July 1, 1932, with 1,000 "useful" airplanes in service, according to a recent announcement of officials of the department. A final appropriation of $12,326,100 has been made available to carry out the act of June 24, 1926, which enacted the aircraft building program of the Navy Department. On June 30, 1930, the Navy had 928 serviceable airplanes and 267 in order.

The fiscal year 1931, is the last appropriating year of the program. Deliveries of the aircraft contracted for during this fiscal year, 1931, should be completed by the end of the following fiscal year, according to the terms of the program. The 267 new ships on order and the 1931 appropriation are expected to bring the total of useful ships to 1,000 by 1932.

According to present plans, 667 planes will be kept in operation with the remainder held in reserve. The five-year program includes a crash wastage and a wastage resulting from types becoming obsolete of fifteen planes for each 100 in use annually.

The five-year building program was inaugurated following the Conference on Limitation of Naval Armament by the Bureau of Aeronautics which outlined a contemplated development of aviation in the Navy. The fundamental principles contained in the tentative program were incorporated in the United States Naval policy which was approved by the Secretary of the Navy, December 1, 1922. In order to formulate an aircraft building program from the viewpoint of economy and utility, it was decided to extend the program over a period of years. At the end of this period the completion of all units required by the Navy treaty during times of peace was contemplated. Although the program had been delayed from year to year because of lack of authorization and appropriations, it remained basically the same as it was in its original form.

Congress did not take cognizance of the Five-Year Aircraft Building Program until 1926 when, at the request of the House Naval Affairs Committee, the Bureau of Aeronautics prepared data as to the needs of aviation in the Navy and submitted a development program projected over a five-year period. With this program as a basis, the 1,000-plane program was evolved, the completion of which was the supply of the Navy Department and the Marine Corps with 667 operating and 333 reserve planes of all types at the end of the five-year period.

The construction of two rigid airships suitable for use as adjuncts to the fleet, the total cost of each ship not to exceed a total cost of $8,000,000 for both, was authorized in 1926; and one experimental metal-clad airship at a cost not to exceed $300,000.

The total amount appropriated by Congress for purchases of airplanes during the fiscal years 1927-1929, inclusive, is $52,445,500. The five-year act of June 24, 1926, authorized a total appropriation of $65,032,500 for these four years. The amount appropriated for the purchase of airplanes for the first four years of the program is $12,552,000 less than the amount authorized.

At the beginning of this program, July 1, 1926, the Navy had 351 useful planes on hand; 468 in 1927; 624 in 1928; and 829 in 1929. The Bureau of Aeronautics has allotted one-third of the planes to the battle fleet and has placed more than one-half of its total aircraft afloat with the battle, scouting and Asiatic fleets.

To Open Bids for New Airplane Carrier of Navy Department

BIDS will be opened August 12 for the new airplane carrier CV-4, the first ship of this type to be originally designed and developed as such. The carriers, *Langley*, *Saratoga*, and *Lexington* are converted ships, the first having been the collier, *Jupiter*, and the other two designed as battle cruisers.

The carrier CV-4 will weigh 13,800 tons, one-fifth of the tonnage left to the United States under the terms of the Washington treaty. The total cost of construction of the CV-4 must be $19,000,000 (or less), this being the maximum sum appropriated for this purpose by the act of February 23, 1929.

The CV-4 will accommodate as many planes as either the *Lexington* or the *Saratoga*, although costing less than one-half as much as either of these carriers. The craft will be of the "flush-deck" type and will have a maximum amount of landing space available.

A speed of twenty-nine knots will be developed by the CV-4. Anti-aircraft battery only will be carried. Steam turbine machinery will propel the ship.

Air Corps Reserve Officers Ordered to Active Duty by War Department

THE following Reserve officers of the Air Corps have been ordered to extended active duty, according to a recent announcement of the War Department: July 2 to December 31, 1930: 2nd Lieut. Charles Frederick Scott, Farmingdale, L. I., New York, to Selfridge Field, Mich.—2nd Lieut. Wm. Warner Caldwell, Oakland, Calif., to Rockwell Field, Calif.—2nd Lieut. Robert K. Urban, Abilene, Texas, to Rockwell Field, Calif.,—2nd Lieut. Harry W. Fowler, San Antonio, Texas, to Dodd Field, Fort Sam Houston, Texas—2nd Lieut. Wm. Groen, Jr., Whittier, Calif., to Rockwell Field—2nd Lieut. Sheldon B. Yoder, Almont, Mich., to Selfridge Field, Mich.; 2nd Lieut. Horace J. Reid, Pilger, Neb., to Selfridge Field, Mich.—2nd Lieut. Carl Brewer Fry, Pasadena, Calif., to Rockwell Field; June 29 to Dec. 27, 1930: 2nd Lieut. Henry Bishop Fisher, San Francisco, Calif., to Crissy Field, Calif.—2nd Lieut. James H. Gray, Champaign, Ill., to Selfridge Field, Mich.—2nd Lieut. Willard J. Venen, Harrisburg, Pa., to Langley Field, Va.; June 15, 1930 to June 14, 1931; 2nd Lieut. George Raymond Cullman, Jersey City, N. J., to Mitchel Field, New York; July 6, 1930 to June 30, 1931; 2nd Lieut. William Russell Bradford, Bonham, Texas, to Fort Sam Houston, Texas.

ASSISTANT Secretary of War T. Trubee Davison was to start upon a 10,000-mile aerial inspection tour of Army Air Corps activities on July 30, according to plans announced July 27 by the War Department.

This extensive journey, which will reach from the Mexican to the Canadian border and from the Atlantic to the Pacific Coast, will be made in a Consolidated Fleetster.

Naval Planes at National Races

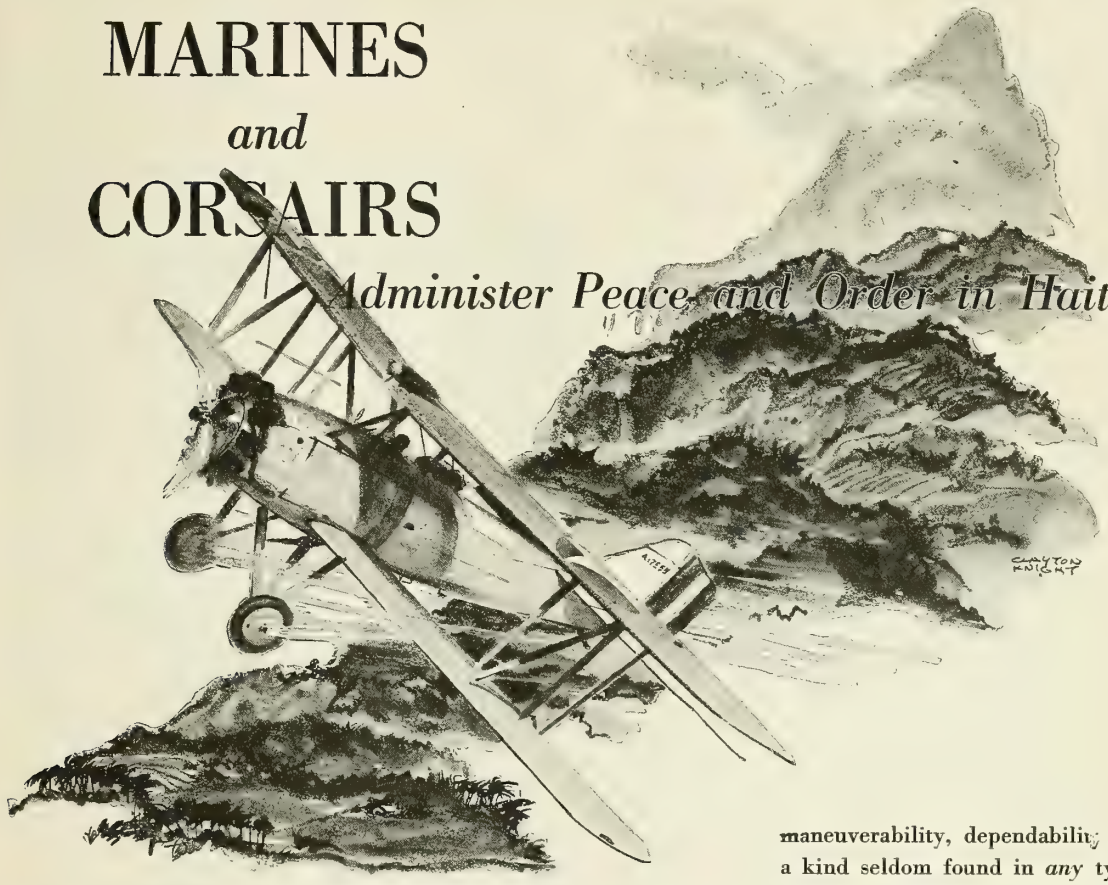
THE Naval Air Service will be represented in the National Air Races, Chicago, Ill., August 23-September 1, by one eighteen-plane squadron of fighting planes from the Battle Fleet; one twelve-plane Marine Corps squadron of fighting planes from Quantico; and the *Los Angeles*, according to a recent announcement of the War Department. Commander Aircraft Squadrons, Battle Fleet, will designate a squadron from one of the Aircraft Carriers *Saratoga* or *Lexington*. Col. Turner, head of Marine Corps Aviation, Bureau of Aeronautics, will nominate the Marine Squadron.

TWO F8 C-4 two-seater carrier fighters will be equipped with floating ailerons, slots and flaps similar to those on the Curtiss Tanager, according to a recent contract given the Curtiss Aeroplane & Motor Company by the Navy Department. The equipment will be operated exactly as that on the Tanager. The flaps will be mechanically operated by the pilot and the slots will be automatic, with a device for locking them closed if desired. The floating ailerons will be placed as a continuation of the lower wings of the biplane.

THE summer flying course for the midshipmen of the Class of 1932 began July 1. The schedule is so designed that two groups of twenty midshipmen report at the Reina Mercedes Dock for flight drill each weekday except Saturday. In addition to time spent in the air the midshipmen in training receive instruction on the ground. Five patrol type planes were available to start the course.

The MARINES *and* CORSAIRS

Administer Peace and Order in Haiti



THE ISLAND of Haiti has, among other things, a complete set of airplane hazards and difficulties.

A varied coastline. A mountainous interior. Landing fields few and far between. All of the things that put the dependability and sturdiness of a plane at a premium.

These are the critical flying conditions under which *Corsair* No. A-7559 has been operating since 1928.

Marine Corsairs must be prepared to go anywhere on the face of the globe. To meet every kind of flying condition — from "mountain hopping" to picking a landing spot in the midst of a jungle.

They are used to this kind of assignment. In fact, they are made especially to stand it. Ruggedness, maneuverability, dependability of a kind seldom found in *any* type of ship are built into every *Corsair.*

It is these flying qualities and this ruggedness that have made *Corsairs* the standard Naval observation plane — that have sent them with the Marines not only to Haiti but into many of the most trying situations an airplane can meet. CHANCE VOUGHT CORPORATION, East Hartford, Connecticut. Division of United Aircraft & Transport Corporation.

CHANCE VOUGHT CORPORATION



FUNDS PROVIDED FOR SELFRIDGE FIELD

[K. F. ZEISLER]

CONGRESS has authorized expenditure of $689,000 for further improvement and development of Selfridge Field, Mich.

Projects to be included in the appropriation are: $150,000 for officers' quarters; $150,000 for N. C. O. quarters; $339,000 for the completion of hangars, field warehouses, field shops, headquarters and operating buildings, photo, radio, parachute and armament buildings; $6,000 for machine gun butts; and $51,000 for paved aprons.

This brings the total appropriations for Selfridge Field within the last two years to $2,656,400, Congress having previously authorized expenditure of $1,967,400 for barracks, officers' quarters, hospital and improvement of the field by drainage, fills and the construction of a retaining wall.

When work authorized under the new bill is completed, all but thirty-nine of the ninety-six commissioned officers will have quarters and all but sixty-nine of the 135 non-commissioned officers will be provided for. All enlisted men will then be housed in modern barracks replacing the old cantonment style shacks in vogue since 1918.

THE fourth annual summer encampment of the 107th Aero Squadron, Michigan National Guard, was held July 12-26 at the M. N. G. camp, Grayling. Eighteen officers, 100 enlisted men and seven planes were at the camp. Upon his return from Grayling, Major Floyd Evans, commanding officer, plans to move his unit to the new Wayne Country (Detroit) airport, where a new hangar for the State's aviation guardsmen is nearing completion.

THE 03U-1, Naval observation and scouting plane, built by the Chance Vought Corporation of Hartford, Conn., for the Bureau of Aeronautics, was demonstrated recently at the Naval Air Station, Anacostia. The 03U-1, an improved type Vought Corsair, is the latest of the Vought series 02U-1, 02U-2, 02U-3, 02U-4.

This type of plane, equipped with pontoons and catapaulted from the decks of the mother ship, is employed in the fleet on battleships and cruisers for observation work. When used on carriers as a scout, it is employed as a landplane and takes off and lands on carrier decks.

Air Corps Long-Distance Flight

A FLIGHT from Laredo, Texas, to Portland, Maine, making five stops en route, was completed recently in fifteen hours at an average speed of 141.33 miles miles per hour by Lieut. Yantis (Buck) Taylor, instructor in the advanced pursuit training school of the Army Air Corps, Kelly Field, Texas. He used a Standard Curtiss Hawk powdered with a Curtiss D-12 engine. An average altitude of 4,000 feet was maintained practically throughout the journey.

The flight was made for the purpose of testing the mobility of Army Air Corps equipment under varying conditions of terrain and temperature.

The plane used on the flight was built in 1926 and no special preparations were made for the trip. The itinerary of the flight was as follows: Kelly Field, Texas; Muskogee, Okla.; St. Louis, Mo.; Dayton, Ohio; Middletown, Pa.; and Portland, Me.

ELEVEN Air Corps Reserve officers of the 369th Observation Squadron reported for fourteen days' duty at Mitchel Field, L. I., beginning July 6. They were headed by Major John M. Hayward of Crestwood, N. Y.

The others were Captains Thomas D. Behne of New York and Daniel H. Pratt of Cambridge; First Lieutenants Charles S. Cline of Poughkeepsie, Donald K. Mumma of New York, Lewis F. Seaman of Forest Hills and George S. Stead of Norwich; and Second Lieutenants James G. Adams, John D. Crehore and Paul L. Poster, all of New York, and Leo Katzman of College Point.

THE enlisted strength of the Army Air Corps on April 30, 1930 was 11,935, including 292 Flying Cadets, according to a recent announcement of the War Department.

War Department Aviation Pamphlets

THE War Department has issued a number of pamphlets on heavier-than-air and lighter-than-air aviation. These pamphlets may be obtained at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Among these pamphlets are the following: Fundamental Principles for the Employment of the Air Service; Aerial Gunnery and Bombing; The Airship Pilot; Theory of Ballooning; Aircraft Instruments; The Airplane; Airdrome Equipment; Theory of Flight (Heavier-than-Air); Balloons and Accessories; The Non-rigid Airship; Balloon and Airship Hangars; Airship Aerodynamics; Aerostatics; Aerial Photography; Basic Photography; Identification of Aircraft; Airship Coxswain; and The Parachute Rigger.

EIGHTEEN officers of the Army Air Corps hold all of the four flying ratings by which pilots of this service are designated, according to a recent announcement of the War Department. These ratings are as follows: airplane pilot, including junior airplane pilot and military aviator; air observer, airship pilot and balloon observer. The officers holding all of the four ratings include three majors, three captains and twelve first lieutenants. They are stationed at fifteen different posts in the United States and its possessions.

All of the officers of the Air Corps with the exception of eighteen have one or more of these ratings. Sixty per cent of all Air Corps officers hold more than one rating.

THE United States Army Air Corps has ordered 1,435 parachutes from the Irving Air Chute Company, Inc., of Buffalo, N. Y., according to a recent announcement of officials of the Irving company.

THE Switlik Parachute & Equipment Company, Trenton, N. J., has been awarded a contract for 4,600 pack assemblies by the Army Air Corps, Dayton, Ohio, according to a recent announcement of Stanley Switlik, president.

The Switlik company has been awarded patents on their Safety Chute pack featuring one-piece combination pack cover. The pack cover is round and in one piece, and acts as a pilot chute when released.

NAVY DEPARTMENT CONDUCTS RESEARCH ON BLIND LANDINGS

THE problems of blind landings, that phase of blind flying dealing with the ability of the pilot to land his airplane safely under conditions of obscured visibility, are being conducted by the Bureau of Aeronautics, Navy Department, in conjunction with the National Bureau of Standards. For a considerable period of time the Bureau of Aeronautics has been sponsoring and cooperating in tests and experiment with blind flight with a view to qualifying all Naval aviators in this phase of flying.

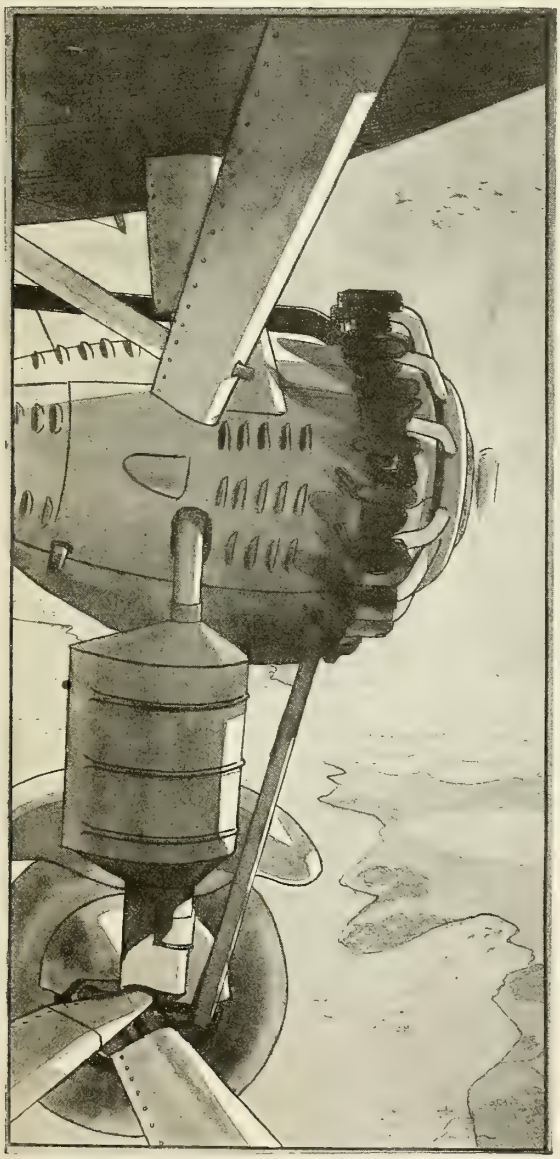
Blind flying is divided into three phases as follows: the ability of the pilot to maintain a steady course by the use of his instrument board entirely; to determine the position of the plane with respect to a known point; and to land without being able to see anything except the flight instruments. The first two problems of blind flying have been satisfactorily met during the experiments which have been carried out by the bureau.

These experiments have been similar to those of the Department of Commerce which has provided navigational aids to the safety of night flying and bad weather flying on the commercial airways. However, the problems of air navigation under unfavorable weather conditions in Naval aviation differ essentially from those encountered in commercial flying. It is necessary for the plane to locate a moving airplane carrier at sea and to approach this vessel from any direction. The Bureau of Aeronautrics will undertake the solution of this problem by installing direction finding apparatus on the plane instead of transmitting directive signals from the carrier, which is the objective comparable to the airport in commercial blind flying.

Once the plane has found the carrier, it is necessary to guide it to a safe landing. Research in connection with the problems of blind landings is being conducted by Capt. Arthur H. Page of the United States Marine Corps representing the Bureau of Aeronautics and working with the Bureau of Standards in the development of apparatus for this purpose. This work is being carried out at College Park, Maryland, under the direction of the Bureau of Standards. Captain Page performs the flight tests in a Vought Corsair provided with completely covered cockpit and flight instruments.

Lieut.-Commdr. D. B. Duncan, head of the Radio Section of the Bureau of Aeronautics, and Lieut. H. D. Rodd of the Bureau of Engineering coöperate in this work.

ONLY WRIGHT HAS BEATEN WRIGHT ALL AROUND THE WORLD!



ONE man only, Admiral Byrd, has flown across both Poles—and he used Wright "Whirlwind" and "Cyclone" engines to make these gruelling flights.

One man only has leaped both the Pacific and the Atlantic. And before Kingsford-Smith hopped from Ireland to America, his same Wright engines had already turned out 80,000 miles!

One man only has made a single jump from New York to Bermuda and back. Before Roger Williams completed this feat, Clarence Chamberlin had flown the same ship and the same Wright motor from America to Germany.

One crew alone has kept a ship and engine speeding aloft for more than three weeks! On this last astounding flight the Hunter brothers rode behind a stock "Whirlwind 300" of the latest type.

One make of motor achieved these four flights. And from the engine that powered the first three hops, Wright developed the magnificent "Whirlwind 300" which has just flown a distance equal to twice around the earth . . . non-stop!

Such performances as these—past and present—not only prove what Wright can do but presage the things that are still in store for the industry and for Wright!

WRIGHT
AERONAUTICAL CORPORATION
PATERSON, NEW JERSEY
A DIVISION OF CURTISS-WRIGHT

TECHNICAL

GERMAN AIRPLANE REQUIREMENTS

As Compared With Those of the Department of Commerce

(PART I) *By*

Richard M. Mock and Eginhard Pappel

Ernst Heinkel Flugzeugwerke, Warnemunde, Germany

IN writing an article such as this, the authors realize that they leave themselves open to criticism by many authorities both in Europe and America. However, it is recognized that with the meager data the airplane analysist has available today there are different assumptions used in various lands for load distributions, load factors, safety factors, methods of calculation, etc. Because it is impossible to make complete tests for each new aerodynamic or structural type and also impossible to prepare a perfect set of general rules governing minimum requirements for all types, certain concessions must be made in compiling a set of government regulations to cover all planes. These sometimes cause difficulties or complications in an unforeseen or unpredicted type. In airplane design, it has been often said, "there are many roads to Rome"; and although, in most instances, the requirements of the Department of Commerce and the "Deutsche Versuchsanstalt für Luftfahrt" (German Aeronautical Research Institute, usually referred to in Germany as the D.V.L.) are similar, there are a few cases that differ so much that one is led to believe that one of these must be wrong, or to state it better, one must be more nearly right than the other. Both organizations, we believe, have made efforts to simplify the requirements and yet have assumptions regarding loading that are reasonable. Both realize their shortcomings and, at the beginning of their books of requirements, make clear what exceptions can be made. The D.V.L. states that, when one can show by test that any assumptions are in error, one can use the other data; the Department of Commerce makes it clear that its rules apply only to conventional constructions, and requires static tests for unconventional designs or types of construction on which there are not sufficient test data to give a definite set of rules.

To cover such a subject thoroughly, one might write a book on each detail of each phase of these requirements. It is possible here, however, to give only a résumé of those details which seem to be the most interesting and the most discussed in aeronautical circles today. It might be of interest to the reader to learn that this article is the result of a study by the authors in investigating the stresses in an amphibion airplane according to the requirements of both countries.

The Department of Commerce airplane airworthiness requirements are divided into five sections:

1. *General*: This section outlines the scope of the requirements, the procedure to be followed for the approval of airplanes, design practice and procedure for making changes in approved airplanes.

2. *Required loads for airplane structures*: This group contains definitions, load factors, distribution of loads and assumptions, and a few suggestions regarding procedure to be followed in preparing calculations.

3. *Light Aircraft*: In this group are some modifications of the airplane requirements to apply to gliders* and low-powered machines.

4. *Required Practice*: This section explains procedure and methods to be used in making calculations, including commonly used formulae, curves, etc., as well as some recommended design practice.

5. *Strength of materials*: Here data are given on the properties of usual materials that are commercially available.

These requirements are bound together in booklet No. 7-A, edition effective July, 1929 (though not officially printed until the end of 1929), containing 87 pages.

The D.V.L. requirements are divided into only two sections, each published under separate cover. One, a handbook of design and shop practice, contains 142 pages printed with an additional plain white page between each printed page so that additions or changes can easily be noted. The other section corresponds to the second group of the Department of Commerce requirements and contains only required load factors and loading conditions. It is a mimeographed loose-leaf pamphlet of 16 pages and five illustrations. As in the United States, changes and additions are made to this from time to time.

The D.V.L. itself has *no requirements* especially for light aircraft or gliders. For gliders (not powered machines), however, there is a small set of regulations by the Rhön-Rossitten-Gesellschaft. The D.V.L. has *nothing* corresponding to the American required practice for stress analysis procedure or methods. German engineers are given a free rein regarding methods of calculations, and for design practice much lies with the manufacturer who in most cases makes static tests himself in the presence of a D.V.L. representative.

In addition, the D.V.L. offers special forms for making aerodynamic and stress calculations. These consist chiefly of an outline of procedure to allow a uniform arrangement of all submitted or prepared data. It is usually not necessary to send airplane data to the D.V.L. headquarters in Berlin because generally engineers representing that institute come to the aircraft factory and check over the data and drawings as well as the airplane itself. Drawings are never submitted but, if necessary, are checked at the aircraft factory. As for materials used, all German manufacturers are required to test samples from each piece in the presence of a D.V.L. representative, usually stationed at each factory.

There is one basic difference in the assumptions made by the D.V.L. and those of the Department of Commerce; the D.V.L. divides its load factors into two parts. One is the load factor actually caused by the acceleration or deceleration and inertia, and the other might be called the safety factor. The strength of materials is required to be such that without the safety factor there will be no permanent deflection greater than 0.02 per cent after the load has been entirely removed. The Department of Commerce load factor is a term which might be considered to be the product of the two factors used by the D.V.L. In a paper presented before the Society of Automotive Engineers in September 1929, A. S. Niles has shown that for many of the American airplanes with low power loadings this safety factor is exceedingly small, being from 0.95 for a PW-7 to 1.76 for a JN-6H. However, in obtaining these figures the machines were maneuvered with considerably more than usual severity.

Although this method of dividing the load factor into the "actual load factor and the safety factor" is more *comprehensible,* it is very difficult and often impossible to carry out in actual practice. To do this, one must know the stress on all materials to give a required minimum permanent deflection. Obviously, this maximum stress must occur only on the maximum design condition. The minimum allowable safety factor for all materials is 1.8. Since the ratio of ultimate strength to the yield point for most steels is nearly 1.8, it is possible to confirm these calculations by static tests with the full design load (the product of the actual load factor and the margin of safety) and thus have a load which is a theoretical breaking load. Where the ratio of the tensile strength to the yield point of a material is greater than 1.8 (materials with low yield point), it is usual to use a theoretical maximum tensile strength to 1.8 times the yield point. American load factors are usually

**The Air Commerce Act of 1926 was recently amended to provide for the licensing and certification of gliders on the basis of their airworthiness.*

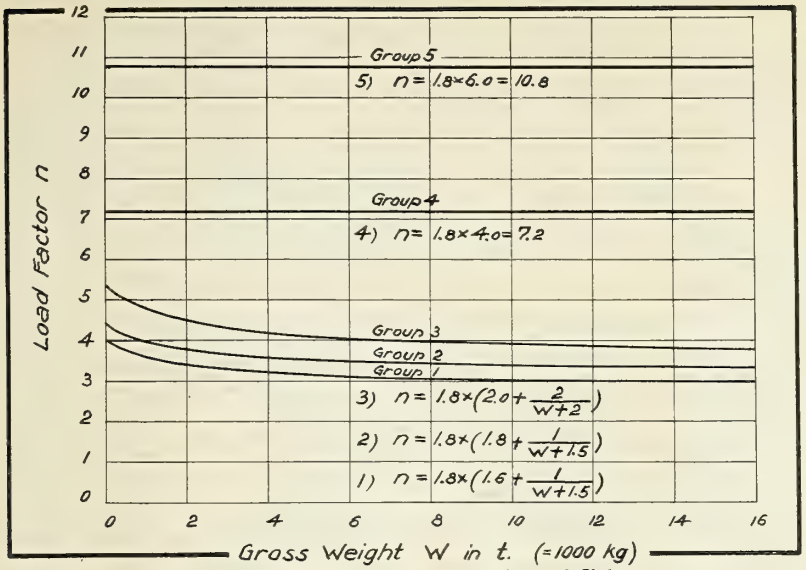


Figure 1. Load factors for conditions of flight

based on the assumption of a theoretical safety factor of 2.0.

For the sake of clarity in this article, however, the term load factor (n) will be used to refer only to the product of the safety factor (s) times the actual acceleration forces (e). The term "margin of safety" means the excess strength over the strength required by the load factor as just defined.

The D.V.L. requires static tests only when clear calculations are not possible or when there is some doubt as to the strength of the materials used. This of course applies to those conditions where there are certain assumptions regarding loading that are not agreeable to the persons examining the calculations.

Inasmuch as there are in Germany only four recognized aircraft manufacturers (Dornier, Junkers, Bayerische Flugzeugwerke and Heinkel), the problem of coöperation between the D.V.L. and the engineers of these firms is by no means as difficult as that in the United States. There are, of course, other manufacturers, but they are of minor importance or are not favored by government orders or do not sell machines to any of the major operating companies in Germany.

All airplanes built in Germany must meet the D.V.L. requirements. The only airplanes that do not come under this category are those built for foreign countries where other specifications are used and the manufacturer does not desire a D.V.L. license.

Regarding the *air* loading conditions, both those of the Department of Commerce and the D.V.L. are alike in that they are based on the assumption that all flying load factors are proportional to those for a high angle of attack condition (*HAA*). In America these loads are determined by the power loading and the gross weight, except for very lightly loaded airplanes for which the load is taken as a ratio of the maximum speed to the maximum weight. This is a more logical assumption regarding the size of the machine.

The D.V.L., we understand, is planning to change its present methods of determining load factors and will base its new assumptions on this speed ratio.. Nevertheless, it might be interesting to note the present method of determining the load factors and to make a rough comparison with the load factors obtained by the curves of the Department of Commerce. The D.V.L. calculates the load factor for the high angle of attack from the data given in Table I and Figure 1.

TABLE I—Airplane Groupings According to Acceleration and Purpose

Possible Acceleration	Purpose: Experimental, H	Freight, G	Passenger, P	Training, S
Very Small Acceleration (1)	H_1			
Small Acceleration (2)....	H_2	G_2		
Usual Flying (3).....	H_3	G_3	P_3	
Limited Acrobatics (4)....	H_4	G_4	P_4	S_4
All Acrobatics (5).....	H_5	G_5	P_5	S_5

The classifications in Table I, which are at present based upon the purpose of the plane, are divided into experimental, freight, passenger and training planes. These types are classified in various groups according to the acceleration to which these airplanes might be subjected. As can be seen from Table I, the acceleration groups are numbered so that "1" is the lowest acceleration and "5" the highest. Training planes are limited to the two highest groups and are usually divided so that the advanced training planes have the higher load factor. The passenger planes are classified into three groups; freight planes are divided into four groups. Generally, however, freight planes are in Acceleration Group 2 and passenger planes in Group 3. Similarly, seldom is there an experimental plane in Group 1 except perhaps a machine for a special record. Only airplanes in Groups 4 and 5 are allowed to do acrobatic flying.

By the D.V.L. methods of calculating load factors, airplanes for unlimited acrobatics (Group 5) have a load factor (n) of 10.8, whereas that given for the lowest power loading and lowest gross weight (and, consequently, the highest load factor) according to the Department of Commerce is 8.4. According to the value given by Mr. Niles in the paper referred to above, it has been proved to be possible to have load factors as high as $7.8\times2=15.6$ when there is a safety factor of 2.0, which might be compared with 14.05 when there is a safety factor of 1.8. The Department of Commerce load factors are, of course, intended only for commercial planes but it must be admitted that many of these planes are submitted to the same acrobatics as military planes designed with a load factor of 12.

For limited acrobatics (Group 4) the D.V.L. load factor is 7.2. By calculating a few typical types of airplanes with both of these systems, one can readily perceive that for machines with a low power loading, the German load factors are much higher, whereas for medium-size commercial airplanes the Department of Commerce load factors are much higher. These load factors decrease with the gross weight, so that for exceptionally large machines the Department of Commerce load factors are only slightly higher.

The D.V.L. methods require that the high angle of attack or A-condition be calculated for the maximum lift co-efficient taken from wind tunnel data. This gives a load that is similar to that required by the Department of Commerce. From the high angle of attack load factor (A-condition) the D.V.L. determines four other conditions: Condition B is low angle of attack; condition C is nose dive; condition D is inverted flight with center of pressure forward of the leading edge corresponding to that which may be called a "low angle of attack in inverted flight"; and condition E, which corresponds to the American inverted flight with center of pressure approximately where it is in high

TABLE II—Load Conditions of Flight

D.V.L. Requirements				Dept. of Com. Requirements	
Load Condition	Load Factor	Dynamic Pressure (q)	Lift Coefficient	Load Condition	Load Factor
A	$1.00N_A$	$1q_A$	C_L *max.*	*HAA*	$1.00N_A$
B	$.67N_A$	$3q_A$	.22 C_L *max.*	*LAA*	$.65N_A$
C	1.80	$4q_A$	*O*	*ND*	——
D	$.33N_A$	$3q_A$	—.11 C_L *max.*	——	——
E	$.50N_A$		C_L *max.*	*IF*	$.40N_A$

angle of attack. These various conditions are listed in Table II.

In this table the value of the dynamic pressure is equal to $q = \frac{\rho V^2}{2}$ where $\rho = \frac{\gamma}{g}$ density of the air and V=velocity (meters per second). q_A corresponds to q for A-condition or high angle of attack. Actually the value of q_A is not needed for any statical condition of the wing. But in usual German practice the actual static calculation is based upon the aerodynamical co-efficients of the wing, each multiplied by q and the "aerodynamical area." However, q is also necessary to calculate the D.V.L. loads on the tail surfaces. As can be seen in Table II, all loading conditions are proportional to the A-condition, except nose dive which greatly differs from the American methods.

In C-condition or nose dive $q_C = 4q_A$, which also calculated from the ultimate diving velocity, whichever value is the *smaller* is taken. If the machine weighs some 15,000 pounds or more $q_C = 3q_A$.

E-condition is required only for airplanes for both acrobatic groups. It may therefore be seen that the German condition for acrobatics has one extra flight condition. Also, for airplanes that are not licensed for acrobatics, D-condition is sometimes very severe. In fact, under the present methods of assumptions it has been found that the D-condition may result in loads on the wing in reversed direction that are greater than those on high angle of attack. For the various flight conditions, the D.V.L. takes the usual wind-tunnel curves for the characteristics of the airfoil, whereas the Department of Commerce very kindly furnishes a table with centers of pressure of the most commonly used airfoils. It is usual to calculate all of the forces acting on wing as acting at or about the point of intersection of a "basic" line usually tangent to the bottom of the airfoil and a perpendicular line tangent to the leading edge. This is used because most aerodynamic data on airfoils are given with reference to this point. A resultant force is taken at this point and also a moment. The lift, drag and moment are taken from the wind tunnel data polar curve for the angle of attack for which the wing is to be investigated. The resultant air force of the lift and the resistance acts vertically and is equal to the weight of the airplane; the total lift on the airplane is perpendicular to the flight direction and at 90 degrees to the drag forces. The resultant is shown resolved into two components, one parallel to the drag truss and one normal to the spars. (Figure 2.) By forces and couples these components and the moment acting on the intersection point are resolved into forces in the drag truss and on the beams. In the American requirements it is assumed that the beam component of air is the weight of the machine giving a resultant force acting on the wing in the vertical direction which is heavier than the airplane itself. However, also the system of Figure 2 cannot be said to be absolutely true unless the following assumptions are agreed to:

(1) the propeller thrust is zero;

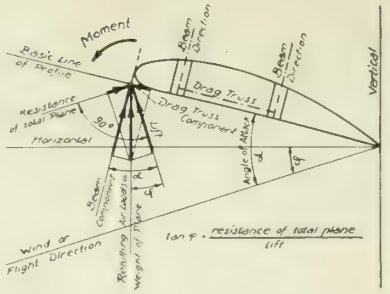


Fig. 2. Air loads acting on airfoil

(2) the load factor acceleration forces are acting parallel to the force of gravity; or

(3) there is a couple of forces to offset the moment caused by the wing and the parasite drag. These are applied as an air load on the tail, and parallel and opposite inertia forces are assumed to act through the center of gravity of the airplane.

The above assumptions apply easily to all flight conditions except the nose dive, which is calculated to be at an angle of attack for the total lift (including the tail) on the airplane equal to zero. For this condition the third assumption is changed so that the tail air loads mentioned are equilibrated by counter air forces on the wing. The weight is equilibrated by the parasite drag, including the propeller resistance. When the ultimate diving velocity is not reached, the weight is also reduced by counter inertia forces.

In addition, the D.V.L. requirements say that generally the torsional deflection on the wing in the nose dive condition must not be more than approximately 3.5 degrees within the actual load (i.e., the breaking load divided by 1.8). This may be demonstrated either by calculations or by static tests, or if the 3.5 degrees are exceeded, a demonstration might be required in order to show that there are no signs of wing vibrations in any of the flight conditions.

The Department of Commerce assumes that in nose dive there is a down load on the front spar the same as that in high angle of attack inverted flight (flight at a great negative angle) regardless of the profile used; the whole weight is applied as resistance along the wing span.

For various wing conditions of cutouts, etc., in airplane wings, it is usual in Germany to use the series of "Fuchs & Hopf,

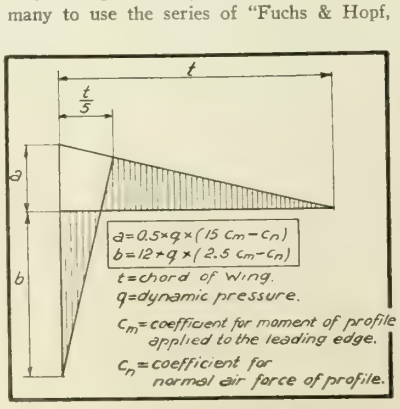


Figure 3. Rib pressure distribution

Aerodynamik" unless the data can be demonstrated in the wind tunnel or otherwise.

The D.V.L. assumptions for the distribution of the beam loads along the span of the wing and the allowances for tip losses, are quite the same as shown in Figure 4 of the Department of Commerce requirements. In the D.V.L. requirements, the tip loss is assumed from a point one chord length from the tip and is tapered to one-half of the running beam load. According to the Department of Commerce requirements, this taper is to 0.8 of the running beam load. The present requirement of the D.V.L. differs from that of the Department of Commerce in that it does not require a 30 per cent increase of load at the strut point but requires that for the calculation of the sections of the beam a rectangular load distributed along the whole span be used, with the running load per square unit continuing constant at the tip. Incidentally, although this second condition has been only recently added to the requirements of the D.V.L., it is understood that it will be revised again shortly when tests now being conducted at the D.V.L. laboratories are completed. These tests consist of subjecting a wing to the beam loads and suddenly removing them and then re-applying them, producing a condition which is similar to a vibration of flight.

The D.V.L. assumes the effect of the aileron loads on the wing spars as the Department of Commerce does, and these loads are completely neglected since the maximum aileron loads will not occur at the instant of the maximum acceleration in one of the flight conditions which are apt to figure in the design of the spars.

As to the strength of ribs, the D.V.L. leaves most to the designers and does not give any pressure distribution for tests such as that of the Department of Commerce, because it is assumed that one has the pressure distribution along the chord on both top and bottom of the airfoil for the section being used. When there is no pressure distribution available, a curve is usually used as shown in Figure 3. Although this distribution is rather old, it gives loads which are quite close to the actual loading in any of the flight conditions. The D.V.L. does not object to rib calculations, though it is usual to make rib tests, except when a new design is similar to an old one for which a test has been made.

Regarding the loads on the control surfaces, the D.V.L. assumptions are quite different from those of the Department of Commerce. The present method of the Department of Commerce bases the assumptions only on the gross weight of the machine and the area of the tail regardless of the speed of the machine, the distance from the tail to the wing, or the moment coefficient of the wing profile used.

The usual method, according to the D.V.L. assumptions, is to calculate the stability of the airplane on each loading condition and thus get tail loads. This may be obtained by the formula:

$$M_{H_1} = C^{m_s} \cdot q \cdot F \cdot t$$

M_{H_1}=moment on the horizontal tail about the center of gravity. C_{m_s} = moment coefficient of the total airplane about the C.G.;

q=the dynamic coefficient on the airplane discussed in the certain loading condition. F=area of the main wings, and t=the chord of the main wings.

In addition to the above load conditions, a second moment is added for the low angle of attack condition (B-condition). In this $M_{H_2}=0.02 \cdot q_B \cdot F^{1.5}$. This moment is assumed to include the additional forces for the elevator, and thus for the low angle of attack the total moments equal $M_{H_1}+M_{H_2}=M_H$; divided by the distance of the center of gravity to the center of pressure of the tail, this gives the total load on the tail. The actual distribution will be discussed below.

The loads on the vertical tail are based on the following formula:

$M_S=0.012 \cdot q_B \cdot F^{1.5}$ where all the factors are similar to the above except the M_S which is the moment for the vertical tail. The above formula is used only when all engines are in the plane of symmetry on the airplane. When more than one engine is used and they are not all on the plane of symmetry of the airplane, the calculation is made by taking the moment of all of the engines (in operation) on one side, and by assuming the thrust to be equal to the static thrust when the airplane is on the ground. The greater of the two moments is used.

For the aileron it is usual to take the loads from the actual pressure distribution for low angle of attack and then add an additional load derived from the formula:

$M_Q=0.012 \cdot q_B \cdot F^{1.5}$ which is quite the same as for the vertical tail. Dividing this moment by the distance of the centers of pressure of both ailerons, one gets the load that is acting on one side upwards and on the other side downwards. Both ailerons are assumed to be acting at the same time with the algebraic sum of the two conditions.

When there are no aerodynamic tests available on the tail the following pressure distribution is used. There are two main conditions for horizontal and vertical tail:

(1) When the control surface is in line with the fixed surface in front of it and a high angle of attack is assumed to bring the center of pressure near the leading edge;

(2) The control surface is assumed to be at an angle to the fixed surface and the latter having a positive or negative angle of attack, thus giving two different conditions. However, for both conditions (where in one the loads are added and in the other they are subtracted) they always give the same total load that is determined in the way described above.

For pressure distribution along the chord Figure 4 is used. The load along the span is to be uniform when applied to unit areas. Should the tail be tapered in plan view the load distribution on the spar is proportional to the taper ratio.

The pressure distribution on the aileron is triangular, decreasing to zero at the trailing edge. The design loads for the hinge fittings are to be doubled.

The D.V.L. requirements of the control system are somewhat similar to the old Department of Commerce requirements, in that the loads are based entirely on maximum forces applied by the pilot and neglect the forces coming from the control surfaces.

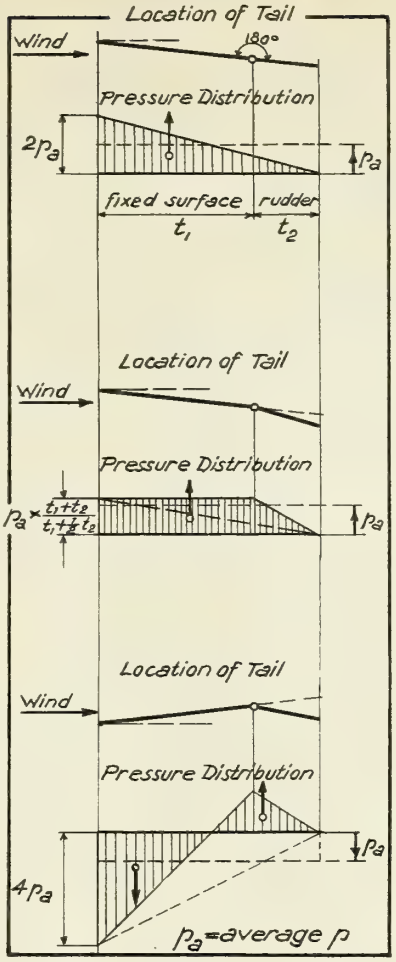


Figure 4. Diagram of tail loading

The system and all of the carry-through members are designed for a maximum load without permanent deflection or for maximum load times 1.8 on to the breaking strength.

The elevator control load is calculated by 90 kilograms (198 pounds) at the stick or the wheel. If a wheel control is used, all of this load must be applied to one side of the wheel only, thus producing an unsymmetrical loading in the wheel and bending in the wheel axis. For the aileron loads, it is required that the controls be strong enough for 45 kilograms (99 pounds) applied at the end of the stick acting in lateral direction. If a wheel is used, it must be strong enough for a moment of 108 kilograms (238 pounds) times radius of the wheel. In addition to each of the above, the wheel or the stick must also be calculated for a condition when 75 per cent of both maximum elevator and aileron loads are applied at the same time. The rudder pedals are designed by a load of 90 kilograms (198 pounds) acting on one side only or for 198 kilograms (436 pounds) on each of both pedals simulating a landing condition. If dual controls are used, the entire system must be calculated when 75 per cent of the maximum loads are applied by each pilot.

All control surfaces have also a minimum requirement for deflection which states that, when the horn or lever arm is fixed and the control surface loaded, the torsional deflection in the control surface with full load would not exceed a maximum of 6.3 degrees for the tail and 14.4 degrees for the ailerons. When a lever or horn is fixed and the controls are moved, the deflection cannot be more than 14.5 per cent of the total travel within the required stick load. Of the load applied at the controls by the pilots, not more than 20 per cent can be taken by friction in the system.

It may be noticed that the odd numbers given above come from the 1.8 factor used in the D.V.L. requirements.

Part 2 of this article will appear in the September issue of AERO DIGEST

AIR COMPRESSOR

A NEW model air-cooled single-stage compresser has been introduced by the Gardner-Denver Company of Quincy, Ill. This product, which is for use in the aviation field, has been named the A-C-E model. It consists of a duplex compressor and a five-horsepower motor mounted on a cast-iron base on top of the air receivers. The units has a displacement of twenty-six cubic feet per minute, operating at a rate of 600 revolutions per minute. This rate can be reduced and altered to fit the particular circumstances.

The suction and discharge valves are enclosed in separate compartments. The valves are special, heat-treated and ground steel discs. The use of the compartments prevents the air from being heated when passing through the intake valves.

An automatic or hand-operated start and stop control is furnished as standard equipment and operated in conjunction with the Penn type pressure and moisture unloader. The unloader is set to cut in at 130 pounds and out at 165 pounds.

Lubrication for the compressor is by a controlled splash system. A positive-driven plunger pump on the outside of the crankcase feeds filtered oil to the troughs under the connecting rods. A special oil ring and groove on the piston prevents oil from passing over to the discharge lines. An oil level gives positive indication of the amount of oil in the reservoir.

Other features of this compressor are: the use of the V-type belt drive; a fan type of flywheel; use of Hyatt type of roller bearings; aftercooler in the base, and a muffler for the suction opening.

HIGH SPEED DRILL

WHITMAN AND BARNES, INC., Detroit, has anounced a new type of high speed small drill to be known as the Blue Diamond High Speed Drill.

This drill differs in design from the regular small high speed drill and is given a special heat treatment, the combination of which gives the drill extra strength and ability to penetrate fast.

These drills have been developed in cooperation with Whitman & Barnes engineers.

DIGEST OF FOREIGN TECHNICAL ARTICLES RELATING TO AERONAUTICS

By Elsa Gardner

ENGINE DESIGN

The Development and Progress of the Aero Engine, H. Ricardo. "Engineer," Vol. 149, No. 3882, June 6, 1930, pp. 628-630, and (editorial) pp. 635-636. See also "Engineering," Vol. 129, No. 3361, June 13, 1930, pp. 738-739, for editorial.

AFTER dwelling at length on the achievements in airplane engine design, improvements in fuels and advantages and defects of air-cooling, the author indicates some of the directions in which a departure from orthodox practice might be usefully considered. The superiority of the sleeve valve over the poppet valve is emphasized, especially in the supercharged engine.

With the sleeve valve, compounding becomes comparatively easy because the same valve can be arranged to operate both as an inlet and as an exhaust valve to the high-pressure and as inlet valve to the low-pressure cylinder. By compounding it should not only be possible to improve the economy considerably, but also to reduce the weight, since the cylinders which alone have high pressure and temperature to deal with can be made very light. In a supercharged compound engine one would aim to do the bulk of work in the two-cycle low-pressure cylinder and to use a pair of quite small high-pressure four-cycle cylinders both to take the bite off the pressure and temperature and to serve as valve gear for the low pressure.

Paper presented before Royal Aeronautical Society.

AIRPLANE STABILITY

The Static Longitudinal Stability and the Centering of Airplanes (Sur la stabilite statique longitudinale et le centrage des avions), E. Carafoli. "L'Aeronautique," Vol. 12, No. 128, January, 1930, pp. 15-21, 5 figs.

IN this study of the geometric characteristics of an airplane in flight, simple formulas are established by means of which the degree of stability of an airplane may be calculated before the laboratory tests are made.

General properties of the air currents around the tail surfaces of the plane are discussed, and the thickness of the layers where the air speed is zero, is determined as almost 0.02 of the length of the fuselage. For calculating the decreased current in which the tail surfaces operate (depending on the position of the empennage with respect to the wing), a factor of correction is found between 0.8 and 0.9. The equations are developed for finding the angle of incidence of the empennage and the ratio of the speed around the empennage to the speed of the airplane.

Formulas are derived for determining the static stability of a monoplane and a biplane, as well as those for finding the aerodynamic characteristics of wings.

Concerning the Calculation of Airplanes: Determination of the External Forces (Sur le calcul des avions: determination des forces exterieures), E. Carafoli. "Aeronautique," Vol. 12, No. 133, June, 1930, pp. 213-220, 8 figs.

EQUATIONS are developed for determining the external forces acting on the main framework of an airplane, retaining the notations and formulas employed in the author's article on logitudinal stability published in the January issue of the magazine (and abstracted above).

The total characteristics of flight are derived for each position of equilibrium corresponding to determined conditions, — namely, maximum displacement of center of pressure, maximum ground speed, diving at limited speed, and inverted flight following a vertical dive. The external forces on each element composing the plane are then found, special attention being paid to the wing-truss structure and to the empennage. The relation between the total characteristics of the airplane and the local characteristics is brought out.

AIRPLANE PERFORMANCE CALCULATION

The Practical Utilization of the Logarithmic Polar for the Calculation of the Performances of Airplanes (L'Utilisation pratique de la polaire logarithmique pour le calcul des performances des avions), G. Bilbault. "Technique Aeronautique," Vol. 21, Nos. 100, 101, 102, 103, Feb. 15, March 15, April 15, May, 1930, pp. 35-41, 50-64, 74-90, 100-104, 20 figs.

IT is shown how one may study the performances of airplanes with the aid of the logarithmic polar diagrams. The adaptation of the engine and propeller are traced and a graph deducted from the intersection of the power curves with the polar of the propeller. The polar permits the direct solution of certain problems such as climb, descent, banking and so forth, and arrives at results difficult to obtain by other methods.

The determining of propeller thrust, efficiency, ceiling, wing and plane fineness, angles of attack, consumption, economical speed, acceleration in banking, descent in gliding, and angle of climb is described. The principle of the calculation of climb is explained, but the author concludes that the logarithmic polar is the more simple method.

Paper presented before the Association Technique Maritime et Aeronautique.

AIRSHIP STRESS CALCULATION

The Strength of Transverse Frames of Rigid Airships, Hilda M. Lyon, "Royal Aeronautical Society—Journal," Vol. 34, No. 234, June, 1930, pp. 497-556, 14 figs.

METHODS are developed for calculating the stresses and deflections, in which the transverse frame of the airship is treated throughout as a separate structure on the assumption that the external loads are known and are independent of the elastic properties of the frame. The types of transverse frame selected for examination include the pin-pointed radially-braced frame, the stiff-jointed polygonal ring, the braced-girder polygonal ring, and the stiff-jointed radially-braced frame.

It is shown that the distribution of the external loads applied to the frame by the main shear wires and longitudinals is affected by the distortion of the frame both in and out of its plane. An examination of the relative deflections of the joints of a transverse frame may, therefore, be as important as an investigation of its strength.

The methods suggested are not necessarily those adopted in the design of the R. 101, but they have been developed as a result of the author's experience on the technical staff at Cardington.

PROPELLER STRESSES

Stresses and Strains in Airscrews with Particular Reference to Twist, R. McKinnon Wood and W. G. A. Perring. Aeronautical Research Committee—Reports and Memoranda No. 1274 (Ae. 420), April, 1929, 14 pp., 4 figs.

THE purpose of the investigation described was to calculate correctly the performance of a propeller for use in the process of design, or, for purposes of research, to obtain a knowledge of the extent to which the blades twist under running loads. A theoretical anlysis is made assuming solid homogenous isotropic blades, and equations deduced. A simplified approximate calculation is summarized for drawing office use Hollow blades are also discussed and expressions for bending moments included.

It is found that a short length of blade may be treated as a short length of a cylinder under end load, bending and twisting moments, provided the twisting moment is augmented by a quantity depending on the end load and rate of change of blade angle. Calculation of the centrifugal twisting moment is complicated, but if the center line of the blade is straight and intersects the axis of rotation at right angles, this moment is closely represented by a single term proportional to the greater principal moment of inertia of sections and to the line of twice the blade angle.

SEAPLANE WATER RESISTANCE

The Determination of the Water Resistance of Seaplanes, H. M. Garner and L. P. Coombes. Aeronautical Research Committee—Reports and Memoranda No. 1289 (Ae. 438), October, 1929, 11 pp., 2 figs.

FROM an investigation of different methods of determining the water resistance of seaplanes, it is shown that the direct method of measurement should give the most accurate results, and that design of apparatus is not thought to present very great difficulties. A parallel motion scheme, in which the force on the floats in a single direction is measured, appears likely to be the most satisfactory.

The indirect method of determination, while not likely to give such accurate results as the direct method, is worth pursuing as a separate line of attack. A thrustmeter is essential, and the air log is the better means of measuring the acceleration than an accelerometer. The air log being used at present for take-off tests needs to be considerably improved.

AIRPLANE TAIL FLUTTER

The Flutter of Airplane Tails, R. A. Frazer and W. J. Duncan. Aeronautical Research Committee—Reports and Memoranda No. 1237 (Ae. 392), January, 1930, 27 pp., 6 figs., 10 tables.

A GENERAL survey of the dynamical theory of tail flutter and divergence is made. The motions discussed involve the

(Continued on following page)

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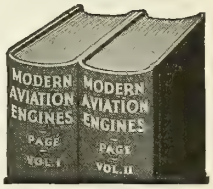
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DIGEST OF FOREIGN ARTICLES

(*Continued from preceding page*)

twist of the fuselage, flapping of the elevators and rudder, and distortion of the tailplane and fin.

Results of the wind tunnel experiments are in good accord with the theoretical conclusions. Antisymmetrical flutters, including the binary fuselage-flutter, binary fuselage-rudder flutter, and the tenary fuselage-elevator-rudder flutter, were demonstrated.

It is indicated that, at least where the tailplane and fin are very stiff, rudder flutter may be avoided by suitable mass loading or by the adoption of a rudder symmetrically disposed about the axis of torsion of the fuselage. Flutter of the elevators can be eliminated by the provision of a very stiff direct connection between the elevators or by mass loading. A high torsional stiffness of the fuselage does not appear to be particularly advantageous. Very close approach to aerodynamical balance of the control surfaces may lead to instability.

WING FLAPS

Wing Flaps of Aircraft, N. MacMillan. "Flight," Vol. 22, No. 25, June 20, 1930 ("Aircraft Engineer" suppl.), pp. 41-431, fig.

IN this article on the forms and effects of wing flap gear used on planes produced by the Fairey Aviation Co., the author concludes that the function originally thought to be the main purpose of the wing flaps (namely, to give extra lift) may actually, in the full-size machine, be less important than the attendant reduction in drag of the whole machine. He considers that there may be some aerodynamic value in using wings the incidence of which can be varied by the pilot.

ENGINE CONTROL AT ALTITUDES

Altitude Control of Airplane Engines, J. Pettitt-Herriot. "Aircraft Engineering," Vol. 2, No. 16, June, 1930, pp. 133-134, 4 figs.

A PRACTICAL description of the vacuum and variable-jet types of altitude control is given with notes on their operation and testing. It is shown that the vacuum control is very suceptible to air-intake conditions, requires absolutely that the float chamber be hermetically sealed, has the tendency to make the action of the carburetor sluggish, and is difficult to control. On the other hand, the variable-jet control is simple to operate and uniform rates of progression are more easily obtained with it. The mechanism for automatic altitude control is described.

METAL CONSTRUCTION

Gloster Metal Construction. "Flight," Vol. 22, No. 1112, April 18, 1930, pp. 431-436, 32 figs.

TYPICAL structural parts used by the Gloster Aircraft Company in the manufacture of its airplanes are illustrated and their application in the wing structure shown. Where a wing spar is subjected to heavy end loads, a diaphragm is introduced which is held in position by clips, the securing rivets being added when the spar is riveted up.

Where greater spar depth is available and where distance between supports is considerable, a lattice girder type of spar has been found economical in weight and simple to manufacture, the number of rivets being small. Instead of diaphragms, short troughs are riveted to the outside of the spar and also serve as supports for the wing ribs.

One form of interplane strut consists of a front portion of steel with a fairing of aluminum. Unusual vertical assembly jigs are shown.

AIRCRAFT PROGRESS

Aeronautical Progress 1914 to 1930, R. V. Southwell. "Engineering," Vol. 129, No. 3356, May 9, 1930, pp. 611-613. See also "Engineer," Vol. 119, No. 3878, May 9, 1930, pp. 512-514.

PREDICTIONS of progress in speed and range, expressed by Dr. Lanchester in 1914 in "The Flying Machine from an Engineering Standpoint" are quoted and their realization outlined. In regard to achievements toward safety in flight, the author considers that a satisfactory solution of the flat-spin problem has not yet been found. What is needed is that attainment of the stalling angle shall not involve loss of adequate control. The action of the Handley-Page automatic slot mechanism is explained.

Reasons for the improvements in the design of the R-100 and R-101 airships are given. The author thinks that the building of these two airships is the outstanding achievement of aeronautical engineering since 1914.

Paper presented before the Institution of Civil Engineers.

TESTING SLOTTED WINGS

Records of the Lateral Motions of a Stalled Bristol Fighter Aeroplane with Slots upon the Upper Wing Tips, B. M. Jones, C. E. Maitland and R. P. Alston. Aeronautical Research Committee—Reports and Memoranda No. 1256 (Ae. 436), July, 1929, 8 pp., 39 figs. on suppl. plates.

THIS investigation is a continuation of experiments described in Reports and Memoranda No. 1181. In these new tests, the Bristol Fighter, Type J, was fitted with a large Bristol fin and rudder, and the standard top wing was replaced by one of R.A.F. 15 section with R.A.E. wing-tip slots capable of being fixed open at any desired gap, or of being inter-connected with Frise ailerons.

It is shown that the addition of slots to the Bristol Fighter have profoundly modified and improved its behavior in the stalled state. The fixed open slots make the stalled airplane very stable laterally, but give little aileron power. The slots operated by the ailerons from a position in which the gap is 0.6 inches bring the lateral motion just on the unstable side of neutrality and give appreciable aileron control which is insufficient to cope definitely and quickly with certain forms of disturbance. All the records in which ailerons are moved suggest that they generate powerful yawing moments in the undesirable sense—retarding the wing that they are endeavoring to raise.

Stalled Flight Tests of a Moth Fitted with Auto Control Slots and Interceptors, E. T. Jones, C. E. Maitland and W. E. Purdin. Aeronautical Research Committee—Reports and Memoranda No. 1292 (Ae. 441), November, 1929, 3 pp. 2 figs.

EFFECTS of the Handley-Page interceptor fitted to a Moth plane with auto slots are reported. The lateral control and stability were tested in stalled flight and the effect of the interceptors in spins and aerobatic maneuvers investigated.

The lateral stability of the aircraft when stalled was good, a striking feature being the unsual rapidity of response as soon as the interceptor comes into operation. In this particular design of interceptor with hinge forward of the rear edge of the closed slat, delayed movement is necessary in order to prevent the interceptor fouling the closed slat in turns at high speed. It is considered that the interceptor device shows great promise, and should be compared directly with the slot and aileron control operating both from the closed and open position.

AUTOROTATION

The Problem of Autorotation, H. B. Irving. "Aircraft Engineering," Vol. 2, No. 16, June, 1930, pp. 142-145, 8 figs. Bibliography.

FACTORS affecting stability and airplane control at low speeds are summarized. The evidence relates more particularly to stability at the stall, especially to autorotation, rather than to control. The case of monoplanes of the thick tapered cantilever type are also scrutinized in view of the stability claims made for it.

Indications of model experiments with regard to the effect of wing section and biplane arrangement on rolling stability at low speeds are considered. Results from the use of floating wing tips and ailerons on the Curtiss Tanager, and the adoption of wing-tip controllers on the Pterodactyl, as well as this plane's progressive washout and sweepback, are discussed.

There is said to be much scope for varying the properties of biplanes at stall by bringing the wing tips close together so as to give extremes of stagger and reduction of gap at tips; in fact, simulating the slot but making it an inherent part of the airplane. The slot has the advantage that when applied to the whole of the span, it confers a considerable increase in maximum lift, and can easily be adapted so that it gives not only a large increase in control, but a control exercised without adverse yawing moment.

METALS TESTING

The Inspection of Metals and Their Alloys, L. W. Johnson. "Royal Aeronautical Society—Journal," Vol. 34, No. 234, June, 1930, pp. 441-486 and (discussion) pp. 487-494, 42 figs.

VARIOUS types of tests for materials and what they tell are reviewed and the defects encountered in metals and their alloys used in the manufacture of airplanes and engines are noted. The author shows that comparatively simple tests are available for use in the workshop and that if these are intelligently applied under the guidance of, say, the laboratory, a much higher percentage inspection of material can be carried out which does not necessitate the use of comparatively expensive apparatus. A really efficient raw material inspection system should be composed of highly trained men, and the status should be equal to that of the "finish view."

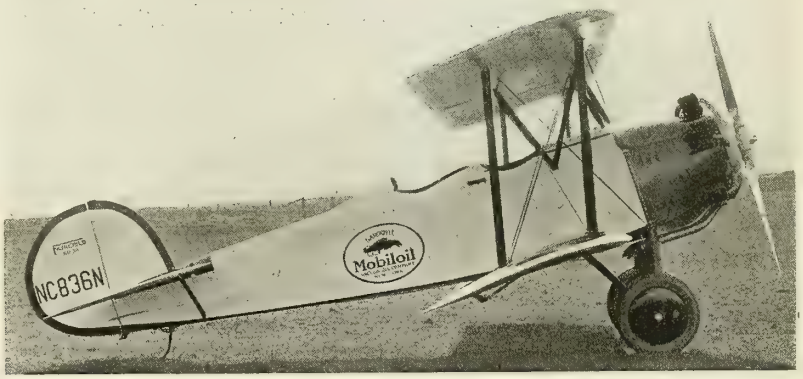
The future trend of inspection should be towards 100 per cent and should be non-destructive. Towards this end the development of magnetic analysis and X-rays will enable raw material to be inspected and etched, and the small type Brinell machine will enable finished material to be inspected.



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FAIRCHILD KR BIPLANES

THE FLAPPING OF AIRSHIP COVERS

By Dr. Max M. Munk

THE lighter-than-air field has lately strengthened its strategic position relative to the heavier-than-air. It is again looked on with favor and expectation by many who thought it doomed as unpractical and out-of-date. This type of aircraft still possesses the proverbial "infancy" complex; we expect the airships to get better every day in every way. The three principal ways in which progress is being made are (1) improving of the structure (and of structural material); (2) lessening of drag by means of the application of modern aerodynamic inventions, resulting in a saving of horsepower; and (3) increasing the speed. This last point is particularly important, for the relatively low speed of the airship at present is its outstanding handicap; this low speed is partly the result of limitations of the size of the power plant. The power required increases as the cube of the speed, and each reasonable increase of speed without aerodynamic improvements requires an unreasonable increase of the output of the power plants. It also necessitates stronger and heavier structures.

There is an additional obstacle to the increase of the speed of Zeppelin type dirigibles. They are covered with a light fabric, and at a certain critical speed this cover begins to flap, considerably increasing the air resistance of the ship and thereby preventing further increase in speed.

Some of the thoughts on the flapping problem expressed here may prove helpful in overcoming this difficulty. The arguments are supported by the results of some tests which were made at the N.A.C.A. laboratory in 1924, and which have never been published. These simple tests were eminently successful and showed promise of furnishing further valuable information for the solution of the problem by merely repeating in systematic variations the test methods then developed. For administrative reasons it became necessary at that time, to give up this line of research, just when its value was established and the results began to be interesting.

The tests were conducted by E. D. Perkins upon my suggestion. A wood frame, four feet by eight feet was constructed, which had three loose corner connections, covered by an envelope of linen fabric weighing 0.135 kilograms per square meter. The tension of the fabric could be varied lengthwise and crosswise by loading it with different weights, pulleys being interposed where necessary. For each combination of tensions, the air flow of the tunnel was started and gradually increased until flapping began. The velocity that started the flapping was noted; it was always sharply defined and could easily be observed. The same tests were made with a frame subdivided in an up-stream and low-stream portion of unequal size, giving two combinations by simply turning the frame around. The result with the undivided frame is represented in the illustration. The critical air speed is plotted to the right, and against it the longitudinal loading is plotted upwards. The different curves represent different transverse loadings.

It is apparent from this plot (and is confirmed by the two other test series with the subdivided frame, not reproduced here) that the transverse fabric tension is the dominating factor in determining the critical velocity of flapping. The transverse tension has only a secondary effect and so, too, has the longitudinal extension of the frame.

That much about the tests actually performed. The tests intended but not performed were of the same character, with different kind of fabrics, varying in weight, stiffness and internal dampening.

In the scientific analysis of the problem, it appears logical to compare the critical velocity with the natural velocity of the fabric waves, the fabric waving like a rope or violin string. If the natural waves have a velocity greater than the velocity of the passing air, they must overcome drag and consequently are dampened out. On the other hand, if the air velocity is greater than the wave velocity, the drag or air resistance of the waves tends to swell them. The transverse fabric tension is only a secondary factor for the longitudinal wave velocity; so, too, are the length of the panel and the stiffness of the fabric. The main factor for the longitudinal wave velocity is the logitudinal tension. The outcome of the preliminary tests encourages us, therefore, to follow this line of argument further.

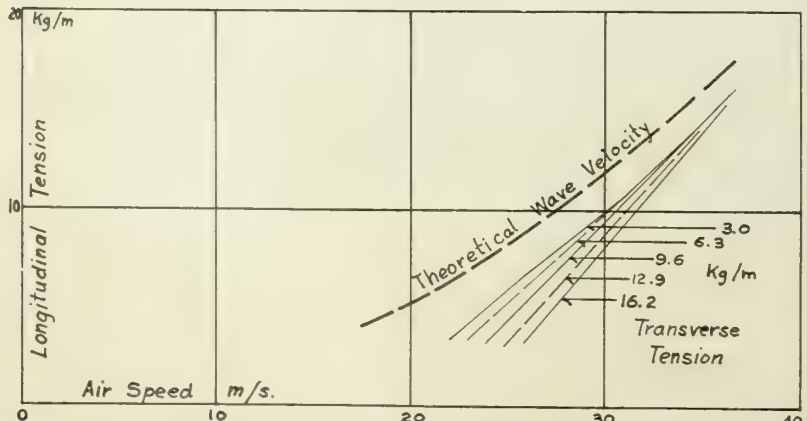
The theoretical value of the wave velocity (string formula) is:

$$Vo = \sqrt{T \times g/W}$$

where Vo denotes the wave velocity, T the tension per unit length, W the weight per area, and g the acceleration of gravity. The wave velocity computed from this formula is inserted into the plot.

It becomes apparent that the critical velocity follows this theoretical wave velocity, as does the stiffness of the fabric.

The tests therefore support the theory that the critical velocity of flutter is practically the same as the natural wave velocity. A helpful thought, showing the limitation of what can be reached and suggesting the way for improvement. Dampening increases the gap between wave velocity and critical velocity, and such dampening could be increased by the choice of special fabrics and by artificial steps. The main improvement will come through increasing the theoretical wave velocity, by putting more importance on the longitudinal fabric stress and less on the circular fabric stress than is done now.



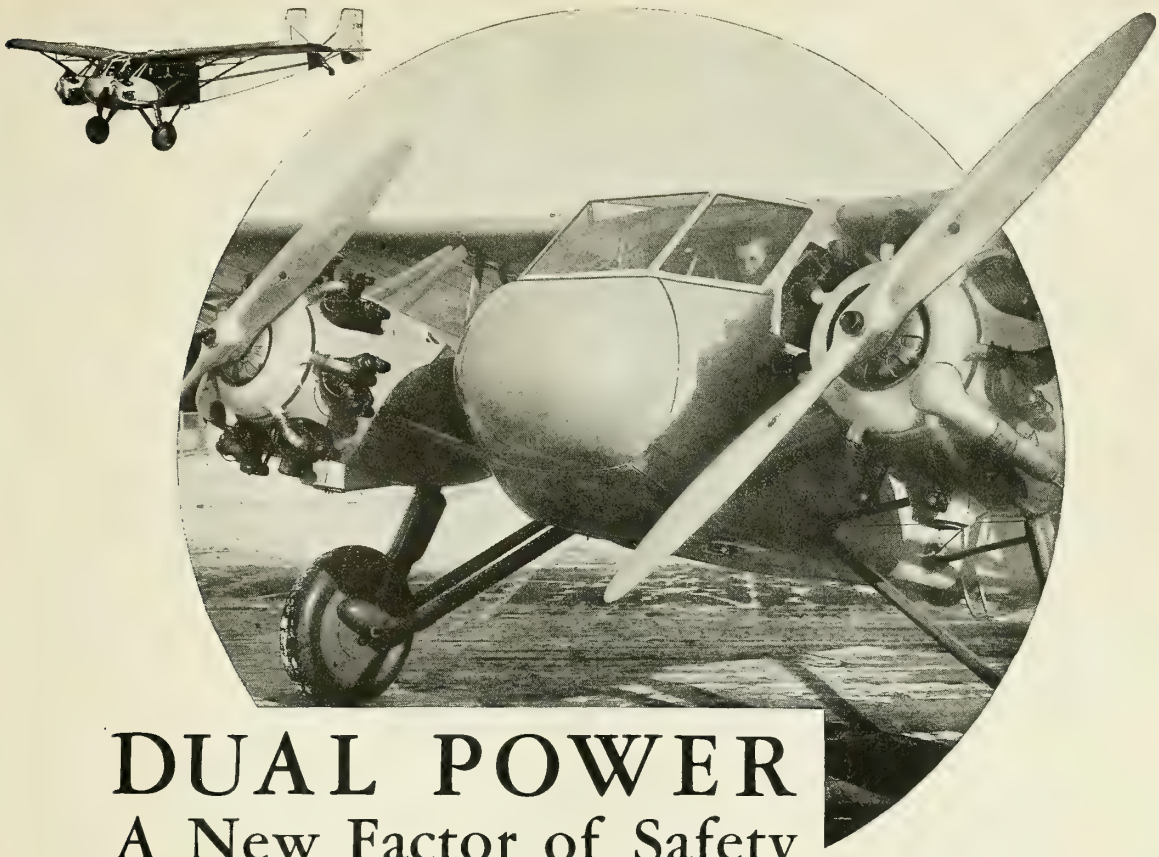
Critical flapping velocity and theoretical wave velocity, plotted against the longitudinal tension

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FRENCH PURSUIT AIRPLANES

(PART 2)

Paul E. Lamarche

IN the first part of this article, published last month, information and illustrations were given for six types of French pursuit planes. Nine more types in this classification, the products of three leading constructors, are described in the present installment.

Wibault

Avions Michel Wibault, located in Paris, was founded in 1924, though Monsieur Wibault designed his first *avion de chasse* as far back as 1917 and built several types of wood and fabric construction before the formation of the present company. In 1921 he definitely abandoned wooden structures and now specializes in all-metal monoplanes designed for pursuit and reconnaissance work in the French and foreign services. Wibault planes are also built in England by Vickers, Ltd., at Weybridge, and in Poland by Panstwowe Zaklady Lotnicze at Mokotow, near Warsaw. Among *chasse* planes Wibault constructs four principal types which are outstanding. These are the 70-Cl, a braced wing monoplane powered by a Jupiter 420-horsepower engine; the "Trombe," which is officially known as the 130-Cl and which is a light Jockey type monoplane; the 170-Cl, similar to the "Trombe," though carrying a higher powered engine; and the 210-Cl, a light low-wing monoplane, which for some time has been undergoing tests before the Technical Service at Villacoublay.

The 70-Cl, a single-seater monoplane of all-metal construction, was built in 1925. It has a rigidly braced high wing which is built up of duralumin spars and ribs, covered with duralumin sheet. The fuselage is of rectangular section, with an arched top and is built entirely of duralumin. For pursuit work the 70-Cl carries four guns, with the standard two Vickers guns firing through the propeller and two Darne guns mounted in the wing. The 73-Cl, which is the same plane with several minor variations and powered with a Lorraine-Deitrich motor, has been constructed for several foreign governments.

The Trombe, or 130-Cl, has a braced parasol wing which is built in two sections joined over the fuselage and carried by N-struts. On both sides, the wing is rigidly braced by a pair of oblique struts that are hinged to the lower longerons of the fuselage. In form the wing is rectangular, and in construction it follows the usual Wibault all-metal characteristics. The spars are of I-section, and the ribs are built up in three parts; i.e., the leading edge, the center section and the trailing edge. The ailerons extend the entire length of the trailing edge of the wing.

The fuselage has a rectangular section with an arched top and is built up with a triangulated structure, covered with duralumin sheet. The empennage, of normal monoplane type with unbalanced surfaces, is of all-metal construction. The landing gear is of the divided axle type and is equipped with oleo-pneumatic shock absorbers. The 130-Cl is powered with the 400-horsepower Hispano-Suiza engine. Its armament consists of two Vickers machine guns shooting through the propeller.

The Wibault 170-Cl is also a pursuit monoplane of the Jockey type and is similar to the Trombe, though a higher powered plane, having a 500-horsepower Hispano engine that develops 580 horsepower. Its weight empty is 2,194 pounds, compared with 1,971 pounds for the Trombe. The 170-Cl was built in 1928 and has been adopted by the French air service. It is known to be a plane of high performance, though performance data are not available.

The 210-Cl is, as mentioned, a light single-seater low-wing pursuit ship. The cantilever wing is built in three sections, a center section and two outer sections. The center section is built integral with the fuselage. The two outer sections are tapered in thickness towards their extremities and are fitted with high aspect ratio ailerons to give the plane greater maneuverability.

The wing is built up with two spars and a normal number of duralumin ribs and is covered with the same material. The fuselage has a rectangular section with an arched top. A headrest behind the cockpit is prolonged to the tail. The fuselage is built of duralumin throughout. The landing gear is of the divided axle type. The empennage is of the monoplane type with unbalanced surfaces. The 210-Cl Wibault is powered with an Hispano-Suiza 500-horsepower engine. Fuel is carried in the center part of the fuselage in a tank of 77-gallon capacity, which can be dropped in an emergency. An underslung Lamblin radiator is carried before the landing gear. The normal armament is two Vickers guns.

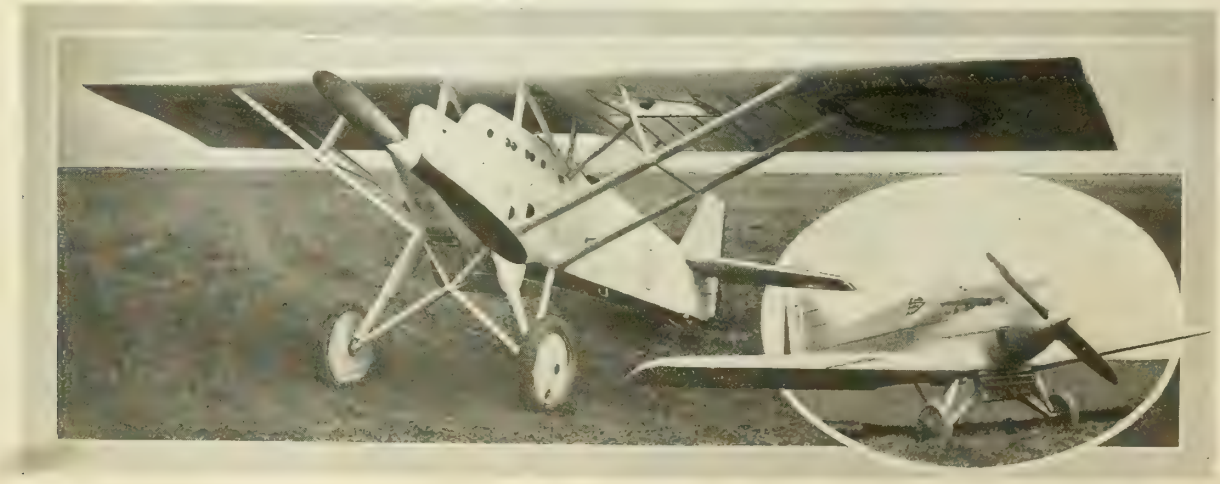
Specifications

(70-Cl)

Span	35.9 feet
Length	24.7 feet
Height	9.7 feet
Chord	6.8 feet
Wing area	236.72 square feet
Service ceiling	16,400 feet
Weight empty	1,823 pounds
Total weight	3,184 pounds
Take-off run	347 feet
Landing run	620 feet
High speed	137 miles per hour
Climb to 3,280 feet	2 minutes 42 seconds
Climb to 13,100 feet	10 minutes 56 seconds
Climb to 26,200 feet	48 minutes
Highest ceiling attained	26,576 feet
Range	3 hours 50 minutes

(130-Cl)

Span	29.75 feet
Length	22.3 feet
Height	9 feet
Chord	6.2 feet
Wing area	182.92 square feet
Weight empty	1,971 pounds
Weight loaded	2,725 pounds
Power loading	6.8 pounds per horsepower
Wing loading	15.1 pounds per square feet
Speed at 9,800 feet	150 mlies per hour
High speed	157 miles per hour



Type 130-Cl high-wing and 210-Cl low-wing Wibault pursuit monoplanes with Hispano-Suiza engines

Landing speed.....64 miles per hour
Climb to 9,800 feet....5 minutes 37 seconds
Climb to 19,680 feet..17 minutes 33 seconds
Endurance.....3 hours

(170-C1)

Span.....29.7 feet
Length.....23.2 feet
Height.....9.1 feet
Chord.....6.1 feet
Wing area.....182.9 square feet
Power loading....6.2 pounds per horsepower
Wing loading...16.8 pounds per square foot
Weight empty.....2,193 pounds
Weight loaded.....3,070 pounds
Entrance.....3 hours

(210-C1)

Span.....30.8 feet
Length.....22.3 feet
Height.....9.1 feet
Chord.....6.2 feet
Wing area.....182.92 square feet
Weight loaded.....2,910 pounds
High speed (sea level)..186 miles per hour
Speed at 9,800 feet.....183 miles per hour
Climb to 9,800 feet....7 minutes 42 seconds
Climb to 16,400 feet...15 minutes 24 seconds
Ceiling.....26,200 feet



Wibault 170-C1, with water-cooled engine and the air-cooled 70-C1

Blériot

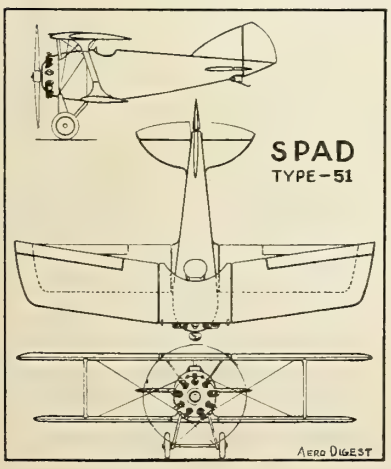
The Société Blériot Aéronautique, which is located in Suresnes, just outside of Paris, is one of the oldest and best known of French aircraft companies, having produced a number of successful models for both military and civil aviation. The firm's pursuit ships are of the Spad type which were developed during the war and which are well known to American pilots. Blériot took over the S. P. A. D. interests (Société Pour Aviation et ses Dérivés) after the war, and has since developed new types evolved from the famous war planes. Three principal Spad machines now used by the French and other air services are described here—the 51-C1, the 61-C1 and the 91-C1.

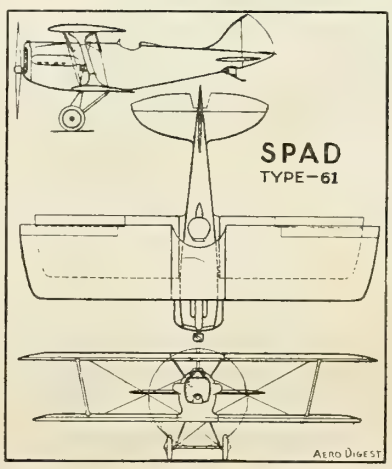
The 51-C1, the oldest of these three types, is a single-seater pursuit ship. The wings are of the single-bay biplane type, the upper of which has considerable sweepback and is built in two sections attached to a center section over the fuselage. The wings are made of either wood or duralumin spars and ribs, and have a fabric covering. The fuselage is the monocoque type and contains a cockpit situated under the trailing edge of the top wing. The empennage is of the monoplane type, with the stabilizer built integral with the fuselage. The landing gear is of the cross axle Vee type. The 51-C1 is powered by a Gnôme Rhone Jupiter 450-horsepower engine and has a normal armament of four guns—two fixed Vickers guns firing through the propeller and two Darne guns in the upper wing which shoot over the propeller.

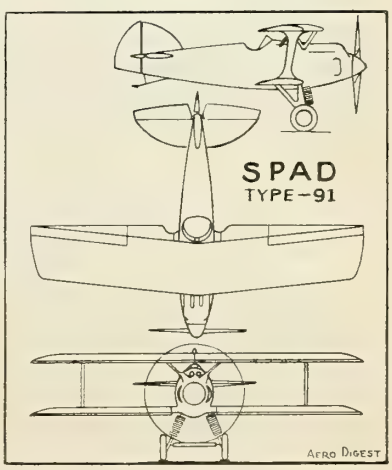
The 61-C1 is also a single-seater pursuit ship with single-bay biplane wings, though on this type there is no sweepback to the upper wing and the ailerons are on both wings. The wings are slightly staggered and are braced by interplane I-struts. The fuselage has an oval section, and the cockpit is placed under the cutout in the upper wing. The tail surfaces are the same as on the 51-C1 and the landing gear also. The 61-C1 is powered by a Lorraine-Dietrich 450-horsepower water-cooled engine. Armament consists of two or four guns arranged as on the 51-C1.

The 91-C1 is a newer and more advanced *avion de chasse*. It is a single-seater Jockey type biplane with wings of equal span and chord. The upper wing has a slight sweepback and is built in two sections which are joined together over the fuselage and supported by N cabane struts. The lower wing sections are attached to short wing roots built integral with the fuselage. As on other Blériot types, the interplane struts are of I form. The unbalanced ailerons are on the lower wings only. The structure of the wing is composed of spars of duralumin tube which have been rolled to a rectangular section. The ribs are also of duralumin and the covering is of fabric. The fuselage has an oval section, the forward part of which is built on channel section duralumin frames

(*Continued on following page*)







Scale outline drawings of three types of Blériot-Spad pursuit biplanes

(Continued from preceding page)

and has a duralumin covering. Aft of the cockpit, the fuselage is built up of duralumin tubular longerons, which are braced by triangular members, and is covered with fabric. The empennage is of the monoplane type. The stabilizer is adjustable in flight and the rudder has a servo flap. The landing gear is the same as that on other Blériot models—the cross axle Vee type. Fuel is carried in a tank in the fuselage which is equipped with a dropping gear. The radiators for the 500-horsepower Hispano-Suiza engine are carried on the front legs of the landing gear, and the underslung oil coolers are carried under the nose. The armament of the 91-C1 is two fixed Vickers guns firing through the propeller.

Specifications

(51-C1)

Span	31 feet
Length	21.16 feet
Height	10.1 feet
Wing area	279 square feet
Weight empty	1,951 pounds
Disposable load	1,047 pounds
Total weight	2,998 pounds
Wing loading	10.7 pounds per square feet
Power loading	6.6 pounds per horsepower
Ceiling	26,900 feet
Maximum speed	152 miles per hour
Safety factor	14

(61-C1)

Span	30.8 feet
Height	9.1 feet
Length	22.2 feet
Weight empty	2,370 pounds
Total loading	1,080 pounds
Weight fully loaded	3,450 pounds
Total wing area	322.8 square feet
Wing loading	10.6 pounds per square feet
Power loading	7.4 pounds per horsepower
Ceiling	26,200 feet
Maximum speed	161 miles per hour

(91-C1)

Span	28.38 feet
Height	9.6 feet
Length	21.39 feet
Wing area	236 square feet
Weight empty	2,470 pounds
Disposable load	728 pounds
Weight fully loaded	3,198 pounds
Wing loading	13.4 pounds per square feet
Power loading	6.4 pounds per horsepower
Ceiling	26,200 feet
High speed	175 miles per hour
Safety factor	13.5

Nieuport-Delage

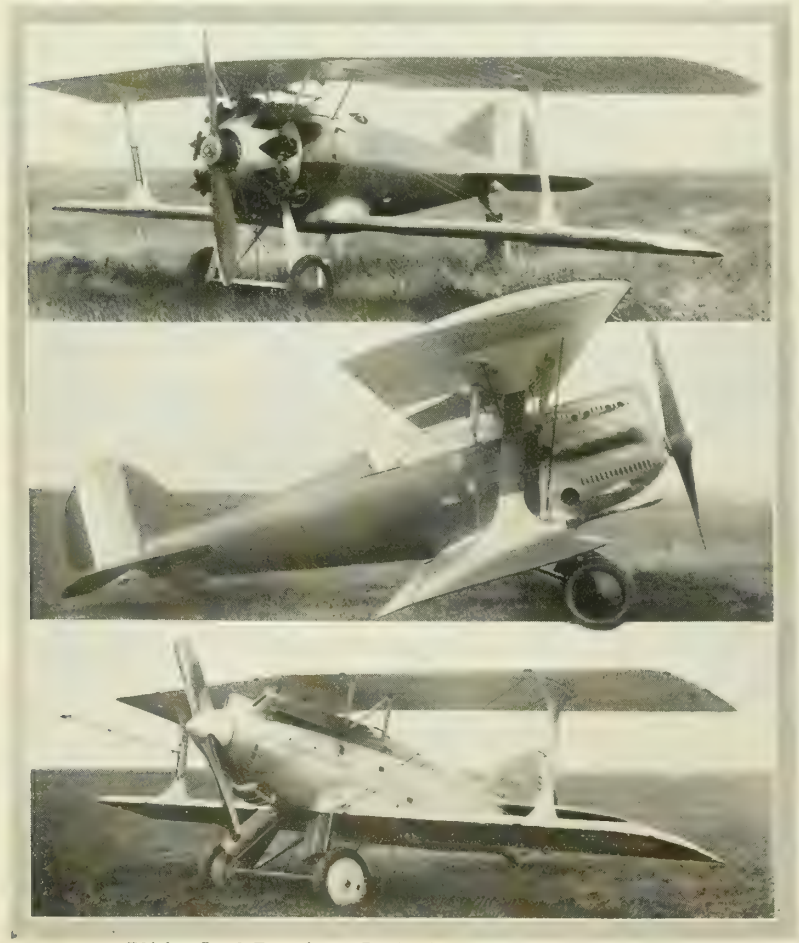
Nieuport pursuit planes were among the best of that type produced by the French during the war and are well known to American aviators who saw service in France. The first Nieuports were built in 1915, and the single-seater Type 11 attracted considerable attention on the Western Front in 1916. A number of succeeding models were produced during the period of hostilities, and at one time they were being built in three plants. In 1917 the American Army Air Service adopted Type 28 and ordered 3,000 of them in the following year.

After the war a number of newer types were produced, and in 1925 the Type 42-C1 set up world records for speed which it still holds. Nieuport-Delage planes are built by the Société Anonyme Nieuport-Astra at Issy-les-Moulineaux, near Paris, which organization has been absorbed by the recently formed Société Générale Aéronautique. The latest Nieuport *chasse* types, the 62-C1 and 72-C1, were developed in 1928. Both types are sesquiplanes of similar design and are single-seater ships, the latter being adaptable for use as an altitude fighter.

The Nieuport 62-C1 is of the Jockey type. It derives its lift from a principal wing, two short auxiliary or stub wings, and an airfoil-sectioned axle on the landing gear. The upper principal wing is in two sections joined together over the fuselage and supported by triangular cabane struts of duralumin tube. Construction of the wing consists of two duralumin spars and plywood ribs, fabric covered, with a plywood covering on the leading edge as far back as the front spar. The ailerons, which are on the upper plane only, are rigidly controlled. The auxiliary wings are built up of wooden box spars and plywood ribs and have a fabric covering. On either side the wings are braced by a Y-strut of duralumin tube passing through the stub wings to the landing gear.

The fuselage is of monocoque form and is built up in two demountable sections. The forward part, including the engine mount, has a duralumin covering; the after section is covered with tulip wood. The cockpit is located under the cutout in the upper wing. The empennage is of wood construction with plywood covering. The rudder is not balanced, and the elevator is in one piece. The landing gear is of the cross axle type composed of two N-struts of duralumin tube, the forward legs of which carry the Lamblin radiators for the engine. The wing bracing struts are attached to the landing gear, which is built of duralumin. The Nieuport-Delage can be powered with any water-cooled engine in a power range of from 500 to 600 horsepower. As used by the French air service, it is powered by the Hispano-Suiza engine which develops 500 horsepower at 2,000 revolutions per minute. Fuel is carried in two wing tanks of 96-gallon capacity which are installed in the top wing on either side of the fuselage and which can be dropped. Oil is carried in the nose under the motor where cooling surface is provided. Two fixed Vickers guns fire through the propeller.

The 72-C1, which is designed after the 62-C1, is of all-metal construction and intended for use both as a light *avion de chasse* and as a high altitude fighter. As an



Blériot Spad Pursuit 51-C1 (top), 61-C1 (center), and 91-C1



Nieuport-Delage 62-C1 with 500-horsepower Hispano-Suiza engine

altitude fighter, its equipment and armament are increased so that its weight empty is 3,969 pounds compared to 3,528 pounds when used as a light pursuit ship; its wing loading is 13.17 pounds per square foot against 10.79 pounds per square foot. In the former case, it can carry two fixed Vicker guns firing through the propeller and two Darne guns mounted in the upper wing, firing over the propeller. Hispano-Suiza 500- and 600-horsepower engines are used for both purposes. The wings are the same as those of the 62-C1 but are built entirely of duralumin, including the covering. The fuselage, the design of which follows that of the 62-C1, is built up of duralumin longerons and has a covering of duralumin strip. On the 72-C1 the empennage and landing gear are of duralumin construction, and the radiators are carried under the auxiliary wings.

Specifications
(62-C1)

Span .....39.37 feet
Length .....24.6 feet
Height ..... 9.8 feet
Area, upper wing.....267.3 square feet
Area, auxiliary wings.....45.7 square feet
Area of airfoil-sectioned axle 18.8 square feet
Total lifting surface.....331.8 square feet
Weight of fuel.....622 pounds
Weight with equipment.....3,082 pounds
Disposable load.....330.7 pounds
Total weight .....3,816.8 pounds
Power loading .....7.6 lbs. per horsepower
Wing loading .....11.5 lbs. per square foot
Speed at 16,400 feet.....155 miles per hour
Speed at 19,680 feet.....151 miles per hour
Speed at 22,970 feet.....146 miles per hour
Speed at 24,600 feet.....140 miles per hour
High speed (sea level)....167 miles per hour
Climb to 3,280 feet.....2 minutes 12 seconds
Climb to 13,120 feet....9 minutes 28 seconds
Climb to 19,700 feet....18 minutes 16 seconds
Theoretical ceiling .....26,900 feet

(72-C1)

Span .....39.3 feet
Length .....24.6 feet
Height ..... 9.8 feet
Area, upper wing.....251.7 square feet
Area, auxiliary wings.....31 square feet
Area of airfoil-sectioned axle 18.8 square feet
Total lifting surfaces.....301.5 square feet
Area of horizontal tail surfaces
46.2 square feet
Area of vertical tail surfaces 16.1 square feet

	Altitude Fighter	*Light Pursuit*
Total weight	3,970 lbs.	3,528 lbs.
Wgt. of fuel	621.8 lbs.	454.2 lbs.
Weight equipped	3,016 lbs.	2,853 lbs.
Power loading	7.9 lbs. per h.p.	7.05 lbs. per h.p.
Wing loading	13.1 lbs. per sq. ft.	11.7 lbs. per sq. ft.
Service ceiling	25,590 ft.	27,395 ft.
Total weight	3,970 lbs.	3,528 lbs.
Theoretical ceiling	27,560 ft.	29,530 ft.
Speed at 16,400 ft.	158 m.p.h.	161 m.p.h.
Landing speed	65 m.p.h.	60 m.p.h.
Climb to 16,400 ft.	13 min. 9 sec.	

THE "CYCLOPLANE" TRAINER

THE Cycloplane powered trainer, designed by C. L. Woodson, formerly designing engineer of the Simplex Airplane Corporation, and built under the supervision of H. S. Myhres and P. D. Smith, is intended for the primary instruction of students. Powered with a two-cylinder 25-horsepower Cleone engine, it has a maximum ground speed of 45 miles per hour. It is of all-metal construction, with the exception of the wing covering.

With the wings locked to the landing gear by a simple device controlled from the student's seat, the use of the rudder alone may be taught; with the device unlocked, the trainer has complete aileron control, allowing the banking of the ship without the wheels leaving the ground. The controls give full maneuverability at low speed, allowing the student to become familiar with the coördination of the controls and giving the sensation of actual flight.

It is impossible for the ship to leave the ground, and it will "fly" with hands off at ten miles per hour, automatically setting itself in flying position, balanced and running on the two three-by-five-inch balloon wheels, which have a tread of four feet. The third wheel prevents the ship from nosing over.

Specifications

Wing span .....25 feet
Wing Chord ..... 5 feet
Length overall .....18 feet
Height .....5 feet 2 inches
Weight empty .....250 pounds

ECLIPSE DYNAMOTOR

A NEW type aviation dynamotor for aircraft radio has been developed by the Eclipse Aviation Corporation, East Orange, N. J., division of Bendix Aviation Corporation. This dynamotor, known as the type A, is especially designed for radio power of multi-engined transport and passenger planes.

The dynamotor has a rated output of 525 watts and is driven from a 12-volt battery. The rated voltage can be attained with a regulation within 12 per cent, for the load changes from zero to full load.

A feature of this machine is its ability to operate under sustained overloads for long periods, the manufacturer claims.

The four-bolt mounting base makes it possible to install it at any point within the fuselage where the length of cable to battery and radio set would not be an obstruction. Remote control and the use of a minimum amount of heavy cable is obtained by designing the dynamotor to operate in conjunction with the Eclipse relay switch. Completely shielded, the dynamotor and switch weighs 30½ pounds.

DESIGN OF WING RIBS

IN obtaining information for the design of truss and plywood forms, as recorded in N.A.C.A. Report 345 by J. A. Newlin and George W. Trayer, tests were made at the Forest Products Laboratory on many designs of wing ribs. Different types in various sizes were compared by means of these tests, in accordance with the request of the Bureau of Aeronautics, Navy Department. Many tests were also made on parallel-chord specimens of truss and plywood forms and on parts of wing ribs, such as truss diagonals and sections of cap strips. It was found that for ribs of any size or proportions, when they were designed to obtain a well-balanced construction and were carefully manufactured, distinct types are of various efficiencies. With ideal construction the truss comes first; second, a lightened and reinforced plywood type; third, a full plywood web type with stiffeners; fourth, a plywood web with lightening holes and no reinforcing; and fifth, a full web with no stiffeners.

Each type has its place in airplane design because manufacturing difficulties set up practical limits for the various types. For example, shallow trusses cannot be manufactured and assembled without great difficulty. Neither can a reinforced plywood truss be substituted for a full plywood type when to obtain maximum efficiency an excessively thin plywood must be used.

The results of the investigation are intended to warn the designer against faulty construction and to aid him in formulating rules regarding the effect of various factors on the design and the strength of different parts.

Report 345 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.



BOEING ALL-METAL "MONOMAIL"

THE Boeing "Monomail" is an all-metal, internally braced, low-wing monoplane with a retractable landing gear. Perhaps the most distinguishing feature of the ship is its ability to carry a heavy payload at high speed.

This model is a radical departure from the familiar biplane types which the Boeing Airplane Company has been building for mail service. It incorporates various features suggested by the operation of the more conventional type of mail planes flying over the lines of Boeing System, operators of the San Francisco-Chicago and Seattle-San Diego mail, express and passenger lines, and by other transport lines which use Boeing equipment.

The location of the center of gravity relative to the landing gear is such that, even under unfavorable conditions, the possibility of nosing over is reduced considerably. As in the biplane type of mail plane, the pilot's cockpit is located aft of the mail compartments, which past experience has established as the safest arrangement.

According to the Boeing company, the "Monomail maneuvers well both in the air and on the ground; is longitudinally and directionally stable, and is easily trimmed. For cruising speeds the angle of vision over the cowling ring, with the seat in the neutral position, varies from four and one-half degrees below horizontal at 1,000 feet to one degree below horizontal at 10,000 feet. The corresponding angles at these altitudes for high speeds are six and one-half and two and one-half degrees below horizontal, respectively.

The wing panels are constructed of a framework of square or rectangular duralumin tubing trussed spars and duralumin trussed ribs, covered with smooth duralumin. The Frise type ailerons (hinged on ball bearings) and the wing tips are of all-duralumin construction with smooth covering.

The wings have been designed to safeguard against wing flutter. A static test of the wing structure has demonstrated that, for either high angle of attack or low angle of attack condition, the front and rear spar deflections are almost identical, which would seem to indicate there should be little tendency toward flutter. In one of the flight tests a diving speed of approximately 215 miles per hour was attained without any noticeable flutter. The wings, designed for safety factor of 5.4 in high angle of attack condition, actually withstood a factor of 6.0 in static test.

The engine mount, which is constructed of welded steel tubing, is detachable at the fire-wall bulkhead. The engine is mounted by taper bolts.

The fuselage is of semi-monocoque construction. Longerons, longitudinal and circumferential stiffeners, and bulkheads are duralumin tubing of square or rectangular section. Covering is smooth duralumin. The bulkheads aft of the cockpit permit passage from the cockpit to the stabilizer adjusting gear. Access to the tail wheel mechanism is provided by means of a removable plate.

The wing stubs, which are of the same general type of construction as the wing panels, are integral with the fuselage. They are designed to house the landing gear when it is in retracted position, and contain two cylindrical fuel tanks with a total capacity of 135 gallons. The tanks are removable through the under side of the wing stubs. The left wing stub, which serves as a walkway for loading and unloading mail, has a hinged nose section providing a convenient space for the storage battery, the radio dynamotor and the generator control box.

The landing gear is equipped with Boeing oleo type shock absorbers and is retractable into the wing stubs. The mechanism for raising and lowering the gear is operated by a hand-crank on the right side of the cockpit. A special indicator, so connected to the retracting gear mechanism as to show whether the wheels are up or down, is mounted on the instrument board. The wheels, 36 by 8, are mounted on roller bearings. Rod control brakes are provided which may be operated from the rudder pedals, either separately or together. In addition, a hand brake is installed for locking both wheels.

The tail wheel, which is of the non-steerable type, is equipped with a Boeing oleo type shock absorber unit and a 9-by-2.5-inch solid tire. It is mounted on roller bearings. The wheel is fully castered and is centered in flight by means of shock absorber cords under initial tension.

The tail surfaces are of all-duralumin construction with smooth covering. External bracing is accomplished by two streamline steel struts below and two streamline wires above the stabilizer. Both elevator and rudder have an overhung type balance and are hinged on ball bearings. The stabilizer is adjustable in flight; the fin is adjustable on the ground.

The control surface mechanism is provided throughout with ball or roller bearings to reduce wear and backlash in the system and to minimize the need of inspection. Control cables inside the wings are removable without disassembling or uncovering the wings. The rudder is controlled by pedals adjustable in flight. The ailerons are controlled by a stick. The elevator is controlled by a stick on a "push-pull" tube, supported as a walking beam by cranks attached to the bulkheads. The stabilizer is adjusted by means of a combination hand wheel and crank. A stabilizer position indicator is provided in the cockpit.

In the first model built, there are three mail compartments, with a total capacity of 220 cubic feet. A sister ship carries six passengers and 1,100 pounds of cargo. The latter ship may be arranged, however, to carry eight passengers and 700 pounds of cargo.

The cockpit is roomy and is well arranged and equipped. The sides are lined with mahogany plywood, removable in sections for inspection and maintenance of the equipment between the lining and the fuselage sides. The pilot's seat, which is adjustable in flight, may be moved seven inches. A heater, so designed that the heat may be deflected in various directions, is installed on each side of the cockpit, approximately midway between the stick and the rudder bar. A hand fire extinguisher is attached to the rear bulkhead at the right side of the pilot. Flares are installed, one on each side of the pilot's seat.

The instrument board consists of a removable center panel (flight instruments) and two fixed wing panels. The center panel is a special Boeing patented flight instrument board providing means of rotation of the air speed indicator, the altimeter and the tachometer. This panel has indirect lighting for night flying.

The engine is a straight drive Pratt and Whitney Hornet, Series B, rated at 575

(*Continued from preceding page*)

horsepower at 1,950 revolutions per minute. The carburetor air intake is at the top of the cowling. The exhaust system consists of a collector ring, a carburetor air heater and a cockpit heater. Engine controls are passed through the mail compartments and are protected by duralumin hinged covers which may easily be removed. A combined hand-electric inertia starter is provided. The booster coil button and the electric starter clutch handle are so arranged as to allow operation with one hand.

The engine section contains a 15-gallon oil tank, 12½ gallons for oil and the rest for expansion space. The oil is cooled by being passed through a nose radiator where its temperature is reduced by air taken from the outside of the cowling through a cooler consisting of seven one-inch tubes built into the oil tank. A nose shutter, operative from the cockpit, is installed.

The Monomail is completely equipped for night flying and for the installation of radio. Provision is made for the installation of a radio transmitter and two radio receivers directly aft of the cockpit. This equipment may be serviced from the ground through an elliptical opening in the body, covered by a hinged duralumin door. The plane is bonded and shielded throughout.

Specifications

Span	59 feet 1½ inches
Length overall	41 feet 2 inches
Chord (at root)	148 inches
Chord (at tip)	90 inches
Weight empty	4,610 pounds
Disposable load	3,390 pounds
Weight of fuel and oil	904 pounds
Payload	2,300 pounds
Gross weight	8,000 pounds

Performance

High speed (sea level)	158 miles per hour
Cruising speed (sea level)	140 miles per hour
Cruising speed (5,000 feet)	139 miles per hour
Cruising speed (10,000 feet)	137 miles per hour
Landing speed (sea level)	60 miles per hour
Cruising radius	600 miles
Rate of climb from sea level	850 feet per minute
Time of climb to 10,000 feet	21.5 minutes
Service ceiling	14,000 feet
Absolute ceiling	16,000 feet

HUNTINGTON CABIN PLANE

THE "Governor," a two-place high-wing cabin monoplane, manufactured by the Huntington Aircraft Corporation of Stratford, Connecticut, is designed for business or sport flying. The ship is powered with a Warner Scarab engine of 110 horsepower at 1,850 revolutions per minute.

The cabin is provided with a side-by-side seating arrangement for passenger and pilot, with unobstructed vision. The appointments in the compartment were styled by Paul Ricker. The cabin is upholstered and English and Mersick aviation hardware is provided. The doors are exceptionally wide to facilitate entrance and departure from the cabin. The windows located in the doors are raised and lowered by a mechanism similar to those utilized in automobiles. Several color schemes, including two tones of green and ivory, are optional.

The landing gear is the split-axle type equipped with Goodyear Airwheels. A tail wheel is provided.

Specifications

Span	33 feet 5 inches
Length overall	22 feet 6.5 inches
Height overall	8 feet 4 inches
Chord at root	6 feet 8 inches
Chord at end	4 feet
Chord, mean	5 feet 4 inches
Aspect ratio	6.27
Weight empty	1,020 pounds
Gross weight	1,650 pounds
Power loading	15 pounds per horsepower
Wing loading	9.2 pounds per square foot
Gasoline capacity	35 gallons
High speed	120 miles per hour
Cruising speed	100 miles per hour
Landing speed	49 miles per hour
Radius, high speed	460 miles
Radius, cruising speed	550 miles



Interior and exterior views of the Huntington "Governor"

BOWERS VOICEPHONE

THE Bowers Manufacturing Company of Chicago has made a study both here and abroad of communicating devices, and as a result of this research, has designed the Voicephone.

The Voicephone consists of two soft rubber ear-pieces, properly padded with a powder puff type cushion, and arranged so as to lie flat against the ears like an ear-muff. A wide adjustable headband is used to hold them in place and the helmet is then pulled on over the ear-pieces. If no helmet is used, the headband will be sufficient to hold them in place over the ears. The headband is attached to the ear-pieces by means of snap fasteners, and may be removed, should the operator desire to attach the ear-pieces to his helmet.

Since only one tube is used for two-way conversation, it is possible for the operators to hear their own voices. The ability to hear one's voice facilitates enunciation.

The Voicephone is equipped with plug couplings. These plug couplings allow the operators to adjust the outfit on their heads before entering the plane. To connect the outfit they need only push their coupling plug into a fitting installed on the instrument board or some other convenient location.

A special acoustic mouth-piece, which eliminates engine noise, is recommended for one-way outfits only. It incorporates a baffle wall to trap moisture and sound. The standard mouth-piece is of soft rubber. Both mouth-pieces have snap fasteners fitted so that they may be held with elastic supports.

The voice tubes are a high grade linen braided rubber composition which possesses good acoustical properties. At the point of junction of the ear-piece and mouth-piece tubes, a composition fitting is attached.

EFFECT OF REDUCTION BEARING ON PROPELLER BODY INTERFERENCE

FULL-SCALE tests have been made in the Propeller Research Tunnel of the National Advisory Committee for Aeronautics, on a ten-foot five-inch propeller on a geared J-5 engine and also on a similar eight-foot eleven-inch propeller on a direct-drive J-5 engine. Each propeller was tested at two different pitch settings, and with a large and a small fuselage. The investigation was made in such a manner that the propeller-body interference factors were isolated, and it was found that, considering this interference only, the geared propellers had an appreciable advantage in propulsive efficiency, partially because of the larger diameter of the propellers with respect to the bodies, and partially because the geared propellers were located farther ahead of the engines and bodies.

Report No. 338 (by Fred E. Weick), covering these tests, may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

VERVILLE TRAINER

THE Verville Aircraft Company of Detroit, Mich., recently announced the Verville Sport Trainer and the Vervllie Service Trainer, built under Approved Type Certificate 323. Alfred V. Verville, who spent seven years as engineer for the Army Air Service, during which time he designed the Verville-Chasse, Verville Packard Racer, Verville Sperry Racer and the PW-1, is designer of these two new biplanes.

The two models are identical except for the equipment, the former being a luxuriously equipped sport ship, and the latter carrying only customary training accessories. They are designed in accordance with all specifications and load factors of Army training planes.

The Verville Trainers are two-place, open, land biplanes, with provision made to convert them into seaplanes. Both cockpits are roomy and are provided with comfortable parachute type seats.

The extreme rear of the fuselage is built with a rigidity which prevents possibility of flutter, weave or distortion of the control surfaces during the most violent maneuvers.

Welded chrome-molybdenum steel tubing is used throughout the fuselage and tail surfaces. The wings are built up of solid spruce spars and spruce and mahogany ribs. A solid upper panel is used, with four degrees dihedral in the lower panels. Sufficient stagger is incorporated to provide unobstructed egress from the forward cockpit. The Clark Y-15 airfoil section is used. Ailerons are riveted duralumin.

Flightex fabric treated with acetate dope and special lacquer is used to cover the entire structure. Hinged aluminum inspection doors are provided at all desirable locations to facilitate servicing of wearing parts.

Brake control system is installed, providing simple, convenient and effective operation of brakes from either cockpit, separately or simultaneously.

The ship is powered with a Continental A-70 engine of 165 horsepower. Standard equipment as a sport ship includes: Standard steel propeller, Heywood air starter, balloon wheels, dual A. P. C. brakes, oildraulic shock absorbers, full caster tail wheel, dual stick control, parachute seats, headrest, two three-piece safety glass windshields, gasoline gauge, tool compartment and kit, air speed indicator, two tachometers, compass, two altimeters, two coil pressure gauges, two oil temperature gauges, navigation lights, dry battery, fire extinguisher, first aid kit, dual throttles, dual switches, dual stabilizer adjustment, baggage compartment.

When delivered as a trainer, the ship has no starter or sundry other equipment not necessary for student work.

Specifications

Span (upper and lower)	31 feet
Length overall	24 feet 3½ inches
Height overall	8 feet 9 inches
Chord (upper and lower)	50 inches
Wing area, upper	124 square feet
Wing area, lower	118.5 square feet
Total wing area	242.5 square feet
Aileron area	27.6 square feet
Weight empty	1,562 pounds
Disposable load	681 pounds
Payload	420 pounds
Gross weight loaded	2,243 pounds
Wind loading	9.27 pounds per square foot
Power loading	13.6 pounds per horsepower
Fuel capacity	36 gallons
Oil capacity	6 gallons

Performance

High speed	115 miles per hour
Cruising speed	95 miles per hour
Landing speed	40 miles per hour
Climb (sea level)	900 feet per minute
Cruising range	3½ hours

GASEOUS EXPLOSIVE REACTION

AN INVESTIGATION of the gaseous explosive reaction at constant pressure was carried out at the Bureau of Standards at the request of and with the financial assistance of the National Advisory Committee for Aeronautics, and is described in N.A.C.A. Report 337 by F. W. Stevens.

In the case of the gaseous explosive reaction at constant pressure, the data given in this report show that the statistical expression, $F=[F]^{n_1}[O_2]^{n_2}$, derived from the order of the stoichiometric equation written for complete combustion of a fuel, is proportional to the spatial rate at which an equilibrium is established in the gaseous explosive system, and that this relation is found to hold for high reaction orders where very complex hydrocarbon fuels are involved in the transformation.

The above relation, since it is based solely upon the initial and final condition of the transformation, is independent of the microprocesses resulting in the final union of the initial active components in the proportions required by the reaction constant K for the temperature and pressure at which the reaction takes place.

The data also provide interesting confirmation of the assumption that high-order reaction processes consist of many simultaneous simpler ones each running its course within the reaction zone "according to its own order and mechanism independently of any other reactions occurring at the same time." The probability of the correctness of this assumption is chiefly shown by the fact that the equivalent reaction order of a composite fuel may be determined from the reaction orders of its components, and further, that the velocity constant k_x of the fuel may also be determined from the velocity constant of those components.

The data given in this report all cover the "explosive limits" of the fuels investigated. Incidental to the purpose of the investigation here reported, the "explosive limits" will be found to be expressed for the condition of constant pressure, in the fundamental terms of concentrations (partial pressures) of fuel and oxygen. It may be seen from the results given that a fundamental relation clearly exists between explosive range and the magnitude of [F] of the fuel.



Verville two-place sport and service trainer powered with a 165 h.p. Continental engine

RECENT AIRCRAFT PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C., at the rate of twenty cents each. State number of patent and name of inventor when ordering.

Landing-hook for aircraft. Robert J. Minshall, Seattle, Wash.; assignor to Boeing Airplane Co., Seattle. (No. 1,760,881)

Landing gear. William B. Stout, Detroit, Mich.; assignor to Ford Motor Co., Highland Park, Mich. (No. 1,760,890)

Airplane. Engemar K. Rystedt, Dayton, Ohio. (No. 1,761,053)

Multiple-propeller drive. Albert Homann, Pittsburgh, Pa. (No. 1,761,077)

Airplane. Charles E. Sparhawk, Steilacoom, Wash. (No. 1,761,242)

Device for receiving and delivering packages to and from aircraft while in flight. Byron B. Bland and Frederick B. de Tienne, Vandalia, Mo. (No. 1,761,290)

Aircraft construction. Edward P. Jones, New York, N. Y. (No. 1,761,444)

Flying-machine. Peter W. Lacina, Leney, Saskatchewan. (No. 1,761,481)

Venturi slot for aeroplane-wings. Benjamin J. Steinmetz, New York, N. Y. (No. 1,761,691)

Airplane. John H. Davis, New York, N. Y.; assignor to Air Line Transportation Co., Philadelphia, Pa. (No. 1,761,710)

Aeroplane. Joseph Ciccoianni, Detroit, Mich. (No. 1,761,777)

Discharging inseticides from aircraft. Hugo Junkers, Dessau, Germany. (No. 1,761,889)

Variable-surface wing. John Van de Putte, San Antonio, Tex. (No. 1,762,002)

Parachute. Charles Kesses, New York, N. Y. (No. 1,762,396)

Flying-machine. Ezzio Francesconi, San Francisco, and Valentino Blanchi, Oakland, Calif. (No. 1,762,657)

Dirigible. Ralph H. Upson, Brooklyn, N. Y.; assignor to Aircraft Development Corporation, Detroit, Mich. (No. 1,762,845)

Aeroplane-control apparatus. Albert B. Willett, Sacramento, Calif. (No. 1,762,851)

Aeroplane. Herman McLind, Los Angeles, Calif. (No. 1,762,874)

Method of manufacturing balloon material; Hans Strobl, Berlin-Tempelhof, Germany; assignor to Luftschiffbau Zeppelin, G. M. B. H., Friedrichshafen, Germany. (No. 1,763,109)

Aircraft construction. William K. Gosner, Atlantic City, N. J. (No. 1,763,147)

Propeller for airplanes and dirigible balloons. Frank W. Caldwell, Dayton, Ohio; assignor to Hamilton-Standard Propeller Corporation, West Homestead, Pa. (No. 1,763,218)

Airplane. Anthony H. G. Fokker, Amsterdam, Netherlands; assignor to Fokker Aircraft Corporation of America. (No. 1,763,228)

Aerofoil. David L. Roscoe, San Diego, Calif. (No. 1,763,257)

Brake-control system for the wheels of airplanes. Georges L. R. J. Messier, Montrouge, France. (No. 1,763,405)

Flying-machine. Coy Orsett, Boston, Mass. (No. 1,763,409)

Safety device for airplanes. Trian Berbeck, Baltimore, Md. (No. 1,763,498)

Aircraft. Charles L. Fortier, Montreal, P. Q. (No. 1,763,507)

Wire netting for airships. Paul Helma and Kurt Bauch, Akron, Ohio; assignors to Goodyear-Zeppelin Corporation, Akron. (No. 1,763,584)

Bulkhead for airships. Paul Helma and Wolfgang B. Klemperer, Akron, Ohio; assignors to Goodyear-Zeppelin Corporation, Akron. (No. 1,763,585)

Gas-container for aircraft. Karl Huerttle, Akron, Ohio; assignor to Goodyear-Zeppelin Corporation, Akron. (No. 1,763,586)

Stabilizing apparatus for airships. Wolfgang B. Klemperer, Akron, Ohio; assignor to Goodyear-Zeppelin Corporation, Akron. (No. 1,763,590)

Device for cooling aircraft-engines. Darold A. Hicks, Detroit, Mich.; assignor to Ford Motor Co., Dearborn, Mich. (No. 1,761,560).

Aeroplane. Francis O. Reed, Paris, Tex. (No. 1,763,819).

Airship. Ralph H. Upson, Birmingham, Mich.; assignor to Aircraft Development Corporation, Detroit, Mich. (No. 1,763,835).

Aeroplane. Roger W. Griswold, 2d, Erie, Pa. (No. 1,763,888).

Means for operating alighting-gear brakes. Wilfred T. Reid, Laurent, P. Q.; assignor to Curtiss-Reid Aircraft Co., Montreal, P. Q. (No. 1,763,985).

Variable-area wing structure for airplanes. Hervey M. Salisbury, Walnut Grove, and Arthur E. Miller, Sacramento, Calif. (No. 1,764,122).

Parachute. Antonio Ferretti and Attilio Corda, San Francisco, Calif. (No. 1,764,293).

Lighter-than-air craft. Joseph T. Narusch, Akron, Ohio. (No. 1,764,336).

Arrangement of motors on the wings of aircraft. Heinrich Focke, Bremen, Germany. (No. 1,764,554).

Airfoil. Clifford C. Jones, Detroit, Mich. (No. 1,764,842).

Aeroplane. Philip R. Chadbourne, Everett, Wash. (No. 1,764,932).

Parachute and aerial life-buoy. Edward G. Johnson, Cape May, N. J. (No. 1,765,075).

Automatic variable-pitch propeller-blade for airplanes. Louis Morris, Kansas City, Mo. (No. 1,765,091).

Parachute attachment for aeroplanes. Joseph Poniatowski, Hunting Park, Calif. (No. 1,765,094).

Aeroplane-wing construction. William A. Woolgar, jr., Detroit, Mich. (No. 1,765,189).

Controlling mechanism for aeroplanes. Simon J. Ax, Longmont, Colo. (No. 1,765,195).

Aeroplane-catapult. Fidel F. Daniel, Ironwood, Mich. (No. 1,765,210).

Amphibian airplane. Federico G. Diago, Habana, Cuba. (No. 1,765,214).

Amphibian aircraft. Anthony H. G. Fokker, Tenafly, N. J., and Alfred A. Gassner, New York, N. Y., assignors to Fokker Aircraft Corporation. (No. 1,765,328).

Amphibian aircraft. Anthony H. G. Fokker, Tenafly, N. J., and Alfred A. Gassner, New York, N. Y.; assignors to Fokker Aircraft Corporation. (No. 1,765,329).

Airport flood-lighting projector. Oscar Werner, South Bend, Ind.; assignor to Westinghouse Electric Mfg. Co. (No. 1,765,354).

Aeroplane-wing arrangement. Stephen V. Muller, Detroit, Mich. (No. 1,765,440).

Automatic control of the steering of dirigible craft. James B. Henderson, Blackheath, England. (No. 1,765,583).

Power plant. Charles G. Curtis and Earle R. Newton, New York, N. Y.; assignor to Curtis Gas Engine Corporation, New York. (No. 1,765,716).

Method and means for constructing airplane wings, fuselages, and other structures. Anthony H. G. Fokker, New York, N. Y.; assignor to Fokker Aircraft Corporation of America. (No. 1,765,791).

Airplane-landing speed-retarding device. Oscar Alvistur, Oakland, Calif. (No. 1,765,818).

Aircraft. Amus Hansen, Berlin-Schoneberg, Germany. (No. 1,765,917).

Flying apparatus. Emile M. Laurent, St. Mande, France. (No. 1,765,924).

Aeroplane safety device. Kurt Fechter, Joliet, Ill. (No. 1,765,972).

Arrangement of rudders for aircraft. Hugo Junkers, Dessau, Germany. (No. 1,766,025).

Airplane-brake. Harvey Hiers, Los Angeles, Calif. (No. 1,766,074).

Aerofoil. John F. Cook, jr. Philadelphia, Pa. (No. 1,766,107).

Aircraft. Clem H. Congdon, Cleveland, Ohio. (No. 1,766,167).

Landing-gear for airplanes. George H. Davis, Augusta, Me. (No. 1,766,245).

Airplane. Julius Danko, Toledo, Ohio. (No. 1,766,284).

Aerocartograph. Reinhard Hugershoff, Dresden, Germany. (No. 1,766,294).

Flying-machine. Joseph de Korwin-Sokolowski, Brussels, Belgium. (No. 1,766,330).

Dirigible. Thad Rose, Van Nuys, Calif. (No. 1,766,358).

Method for attaching on fuselages wings having single spars. Emile J. E. Dewoitine, Chatillon-Sous-Bagneux, France. (No. 1,766,376).

Aircraft. Charles V. Lapin, Los Angeles, Calif. (No. 1,766,390).

Helirotor for aeroplanes. Frederick Wander, jr., New York, N. Y. (No. 1,766,472).

Airplane-lifter. Albert R. Springer, Wirt, Okla. (No. 1,766,844).

Front wing for flying-machines. Heinrich Focke, Bremen, Germany. (No. 1,766,893).

Aircraft. Albert S. James, Eureka, Calif. (No. 1,766,906).

Aeroplane. Joseph A. Lamieux, Washington, D. C. (No. 1,766,914).



KWEI "FLEMING-WILLIAMS" RACER

WITH A SPEED OF 30 M.P.H.

By

R. E. DOWD

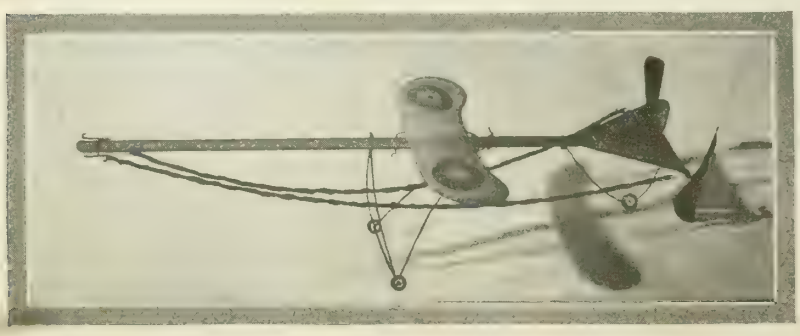
IN our Junior Activities section we have studied and built many kinds of models. They have been both small and large, light and heavy, canards and main plane first, pushers and tractors. We've even studied boomerangs and autogiros! So let's add a racing monoplane to this interesting variety.

For the design and construction we are indebted to Mr. Ming Sing Kwei (pronounced Kwi), a Chinese model builder, now of Detroit, Michigan, who has spent some years in England. In fact, Mr. Kwei calls his model a "Flemming-Williams type" in recognition of the originality of the general design. Some of the older model builders will remember Flemming-Williams as the English youth who first flew a model a distance greater than a quarter of a mile. The construction in general is typically English, but Mr. Kwei has introduced many clever and ingenuous features, which are examples of Chinese thoroughness and attention to detail. The whole model is a splendid piece of workmanship.

In a race for speed or flight in a particular direction, the Kwei Racer is in a class by itself. She has tremendous power in her twin motors and darts along at a flying speed of 20 to 30 miles per hour. The aerodynamical design is not, of course, so advanced as some of the other models we have studied, which have the rubber strands enclosed and are otherwise better streamlined, but sufficient rubber can be carried by the Kwei Racer to drive it by brute power at the extraordinary speed mentioned.

If we were to reduce the drag or resistance by enclosing the rubber, and perhaps by using a single propeller also, but at the same time not changing the weight or wing surface, we would still be required to maintain our same flying speed in order to sustain the weight. The thrust required, however, would be *less* and therefore the amount of rubber could be *reduced*. But now we have only one propeller and our rubber must be all in one skein. If we could reduce our required thrust to one-half, then we could use only one skein and one propeller from the present system and, of course, have the same power duration, but a greatly improved glide. This is a bit optimistic, however; a more likely condition would be a thrust or resistance reduction of one-third, requiring an *increase* in the *number* of strands, therefore *less* turns, which unless we can slow down our propeller revolutions per minute, would result in *shorter* duration. This last is not so difficult because we can *increase* the propeller diameter, which permits us to *increase* our pitch with the same tip angle. With increased pitch our propeller *need not* turn so fast, and we therefore can gain what we have lost in the number of turns, which we can give our rubber motor. Models with propellers of a diameter as great as one and one-quarter times the wing span have been used successfully.

From the foregoing we can see that designing model airplanes is just one great compromise like the design of any other mechanical device. To achieve advantages we must make concessions. The most skillful design, like a "best purchase," is that from which we get the most for the least.



The Kwei-Fleming-Williams model designed for speed

Designers of full-sized airplanes work in just the same manner. They plan, figure, estimate and calculate with just one object in mind—getting the most for the least. Perhaps the "most" refers to light weight or to carrying capacity, or to rate of climb, or any other desirable element of design or performance, but they strive to obtain it with the least sacrifice of some other desirable element.

This is just why designing and studying of model airplanes is such splendid training for future pilots and designers.

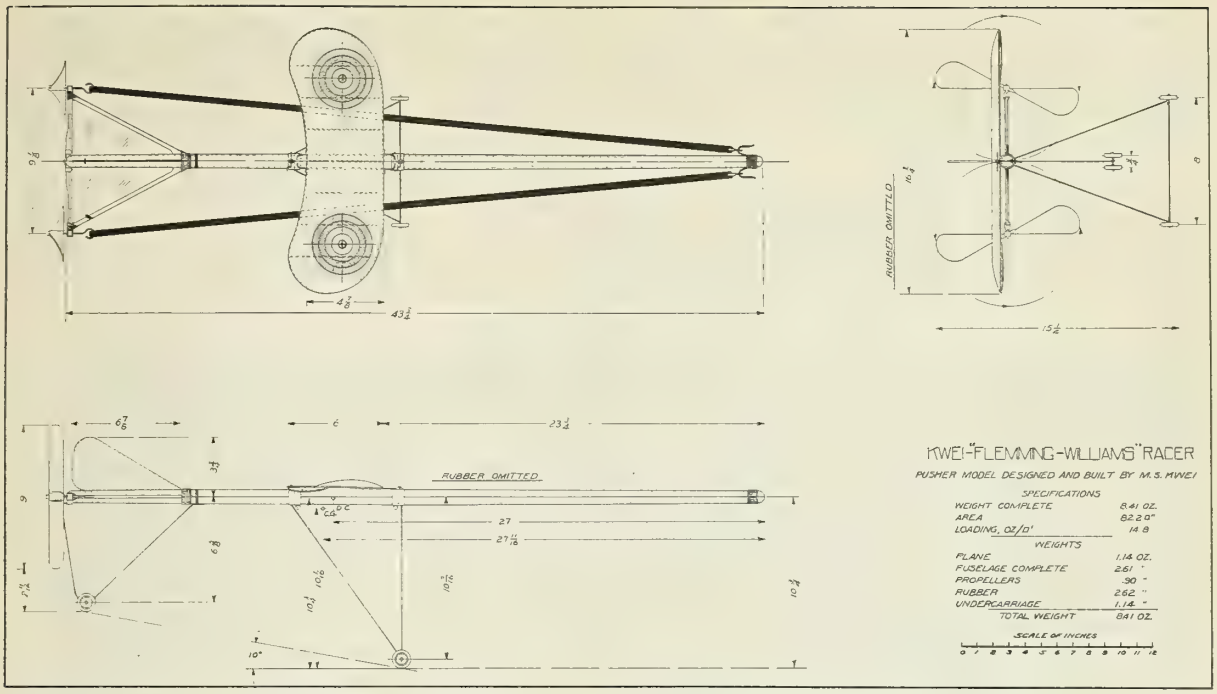
But let's not forget the trim looking Kwei Racer which is just "rarin' to go" out over trees, fences and green meadows at a speed of 20 to 30 miles per hour—not for a few hundred feet but a full half mile! So out with the tools now; let's get started.

The Fuselage, Stabilizer and Fin

The main member of the fuselage is a stick of balsa wood made in halves and cemented together after hollowing out, as shown in the drawing. It is round in cross-section and is tapered slightly toward both ends. In the center the diameter is one inch and the taper reduces this to ¾-inch on each end. The wall thickness is ⅛-inch. Two partitions are allowed to reinforce the tube. These divide the length into thirds.

At the rear the triangular shaped stabilizer fills the area made by the lateral propeller support and the diagonal braces. The propeller support is built up from pieces of selected pine or spruce. The finished dimensions are ⅜-inch wide by 5/16-inch thick by 9⅜ inches long. The width reduces to ¼ inch as shown towards the ends. Lightening slots ⅛ inch wide are provided as shown by spacer blocks of that thickness. The diagonal braces are also of pine or spruce 3/32 inch thick by ¼ inch wide, with the ends widened out for additional strength. The propeller cross-piece is mortised into the main stick, and all joints are wrapped with silk thread and cemented. In order to reduce resistance, all corners of the piece are nicely rounded with sand paper.

The propeller hanger is made from sheet brass 1/32 inch thick by 3/16 inch wide, which bends around the ends of the cross-piece and is wrapped and cemented in place. In order to allow the propellers to be removed, a 3/32 inch diameter hole is drilled through the bearing and cross piece. The propeller shaft has a tubular bearing mounted on it 3/32 inch outside diameter by 1/16 inch inside diameter by 7/16 inch long. A



5/32 inch diameter by 1/32 inch thick flange is provided on one end. In removing the propellers this bearing lifts from the hole in the propeller hanger, leaving ample clearance to work the hook out. A bicycle spoke nipple might be filed and drilled to serve as the propeller bearing, or the removability feature can be omitted and the hanger drilled only for the wire propeller shafts.

The fin is made from music wire about 3/64 inch diameter. It is covered with silk like the stabilizer. The silk is carefully sewn on by hand and treated with a thin coat of varnish. There are so many different kinds of varnish that it is advisable to experiment with a particular kind on a piece of silk tacked to a cigar box or other open frame before applying to the actual surface.

Although this model has flown exceptionally well, it would seem from the location of the directional center, or D.C., that the fin surface might well be increased. This can be tested out with a piece of cardboard, which can be trimmed easily between flights and later the final fin can be made.

The hook for the rubber strands at the front is of 3/64-inch music wire and is formed around the end of the fuselage stick. Silk thread wrapping, coated with cement, holds it in place. The whole fuselage frame is varnished for protection.

Making the Main Wing

Here's a new type of wing construction—no wood, no spars, no cut out ribs—just silk and wire. If you have never soldered, you must make some practice joints before tackling this job. Then take a flat board and lay out the outline and the seven ribs as shown by the dotted lines in the top view. Now, take the coil of 3/64-inch music wire and cut off the correct lengths for the various ribs and the outline. Allow for a ½-inch right angle bend on each end of the ribs and a ¾-inch lap where the ends of the outline join. Fine wire is used to wrap the joints. Then they are soldered. Small nails are used to hold the parts in place on the board before soldering. A curvature of ⅝ inch is used in the ribs two inches back from the leading edge. U-shaped pieces of wire with the ends bent at right angles are used at the center to fasten the wing to the attaching clamps. These pieces are soldered to the ⅜-inch wide brass clamps, which have small tightening cranks made from bicycle spokes. These cranks screw into small nuts soldered to the other end of the clamp and are very effective. It is an easy matter to slide the wing forward or back for adjustment, simply by loosening the clamps. The wire frame is covered with varnished silk as explained for the stabilizer.

Carve the Twin Propellers

Two blocks of selected white pine 2¼ inches wide by 15/16 inch thick by 9 inches long will make the propellers. The front view gives the blade shape which is obtained by drawing diagonals from corner to corner and allowing a hub ¼ inch wide. This gives a pitch of about 12 inches. The blades are carved with considerable camber and are carefully sandpapered and varnished. The propeller shafts are 1/16 inch diameter wire, and washers are used for thrust bearings.

Build the Landing Gear for R.O.G. Model

Better flights are made without the landing gear, but if R.O.G. flights are desired, it entails only a little more work. Again 3/64 inch music wire is used throughout, and clamps with cranks are used on the front gear for the attachment to the fuselage stick. The wire is bent to the curvature of the clamp and soldered for attachment. Four one-inch diameter rubber tired aluminum wheels are used. The wheels may be obtained from model airplane supply houses.

The rear gear attaches differently. As shown on the side view, the upper end attaches at the apex of the stabilizer by a piece of rubber strand wrapped around the loop of wire. The rear terminates in a clip of sheet brass, which has two lugs clipped over the rear cross-piece on each side of the fuselafe stick. The other details and dimensions are clearly shown in the drawing.

The Rubber Motors

If the weights work out as indicated in the drawing, about 2.6 ounces of rubber will be required. Motors of various powers have been tried out. At one time ten strands of 3/16 inch flat were used on each propeller. This allowed a maximum number of turns of about 900 and an average of about 750. The exact amount necessary can best be determined by trial.

Performance

The best duration of the Kwei Racer is 68 seconds. The average altitude is from 100 to 150 feet. Because of the high speed the direction of flight is pretty independent of ordinary winds. For R.O.G. flights a run of about 30 to 40 feet is necessary to take off. The flights are greatly reduced in distance and duration. The best distance on record is over 3,000 feet, which is an estimated distance, there being no measuring facilities available at the time. It is apparent that a favorable wind must have aided in this flight because with a propeller pitch of about 12 inches, and a total number of turns of only 900, we can only account for about one-quarter of that distance. The point is that the Kwei Racer can fly in stiff winds and with an average duration of a minute, and with a good tail wind helping, exceptional distances can be accomplished.

(Continued on following page)

(*Continued from preceding page*)

Flights of 2,000 feet are not unusual. The directional stability is extraordinary, which is doubtless the result of the high speed making the model independent of the gusts which ordinarily change the direction of the flight.

Because of the high wing loading (14.8 ounces per square foot) and the high resistance, the glide is decidedly poor. As soon as the power is exhausted the model comes down on an angle of about one in two or three and seems to fall rather than glide. However, while the power is one, the stability is faultless and the flight course has the directness of an arrow.

Did You Miss Any of These Points?

1. Who is Flemming-Williams?
2. To what can we attribute the flying speed of the Kwei Racer?
3. What are the wing loadings of the following models described in Junior Activities: Pegasus, Bantam, Albatross, Jr., Junior Lockheed Vega?
4. How does the wing loading of the Kwei Racer compare with these other models?
5. Do you need high wing loading for speed?
6. How might the performance be improved?

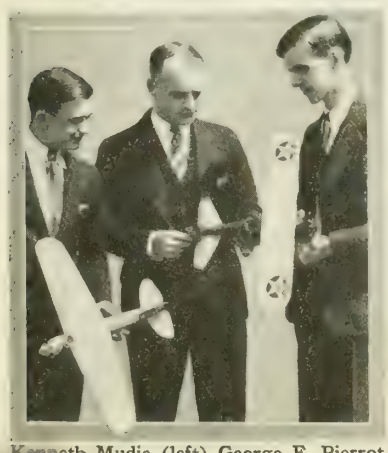
RESULTS OF THE A.M.L.A. CONTEST

by Martin A. Klaver, American Boy Magazine

AGAIN this year, as in two previous contests, boy model builders entered in National Airplane Model League of America contests sponsored by the *American Boy* magazine, proved their enthusiasm and their inventiveness by bringing to Detroit models capable of far better performances than any hitherto reported. Rules had been changed in the outdoor event to prevent lucky flights. Planes were required to have a wing area of a least 125 square inches and to weigh at least two and a half ounces—but a scale model that scored ten points higher than the best entered last year and an indoor ship that added more than three minutes to the endurance record testify that model airplane building does not stand still.

The most spectacular victory of the contest was that won by Ray Thompson, 17-year-old Detroit boy, who flew his balsa-and-tissue model 11 minutes and 47 seconds, breaking into fragments the old mark of eight minutes and 33 seconds set by Joseph S. Culver, Oakland, Calif., last year. Thompson's tractor plane had a sweepback propeller, a tail assembly set out on a boom back of the 16-inch fuselage stick, and a 23-inch cambered wing. He doped his rubber motor and gave it 2100 turns—more than twice as many as the number considered the limit a few years ago.

Carl Goldberg, 18 years old, New York City, gave Thompson a stiff battle with a totally different design. Goldberg's ship had a 30-inch cambered wing, with tips set at a five-degree angle, and he used a 15-inch propeller pitched so high that spectators could count the revolutions. Ernest McCoy, Detroit, an innovator who is always a threat, had his wing covered with aluminum foil; and Donald Burnham, Lafayette, Ind., 1929 outdoor champion, had a double-wing pusher-puller model. Herbert Owbridge, 17, Oakland, Calif., designer of the ship used by Culver in 1929, used an improved model of the same type—and placed fourth.



Kenneth Mudie (left) George F. Pierrot, managing editor of American Boy Magazine (center) and Wm. Chaffee

The winner of the scale model event, William Chaffee, seventeen, Dayton, Ohio, submitted a 24-inch wingspan model of a Boeing P-12B that scored 97. Chaffee built a welded-tube fuselage model with a wing duplicating the original in all details—even the corrugations on the metal ailerons and tail surfaces were to scale. Controls operated from the cockpit, the propeller—which Chaffee made from the same metal as that used in the propeller of his original—turned, the motor was cast in two pieces, and the tail skid gave to the pressure of a finger. He spent 500 hours on his model, quitting his job and working on it day and night to finish it in time. Eugene Kettering paid him $500 for it.

Joseph Ehrhardt, 17, St. Louis, Mo., outdoor champion, used the standard twin-pusher model to win the outdoor contest, but several new types were entered. A Chicago boy had a pusher-puller type. Burnham had a four-moter pusher-puller plane, and a number of entrants entered tractors.

This year's contest saw the William B. Stout trophy and $175 in cash prizes for fuselage model planes awarded for the first time. The rules call for planes of 125 square inches in wing area weighing one ounce for each 50 square inches, with double-surfaced wings and a maximum fuselage cross-section at least equal in square inches to the fuselage length squared and divided by 100, and with wheels at least one and a half inches in diameter. A further stipulation is that the models must rise from the ground.

Ehrhardt, the outdoor champion, also won the fuselage event. His plane was a tractor high-wing model.

As a reward for their achievements, Thompson, Chaffee and Ehrhardt left Detroit July 3 to tour Europe at the expense of the *American Boy* and the Stinson Aircraft Corporation. On July 20, at Halton, England, they are to enter the international competition for the Wakefield Cup, offered under the same rules as those in force for the Stout fuselage contest. With them went George Schairer, Summit, N. J., son of Otto C. Schairer, vice president of the Radio Corporation of America, who is being sent by his father as a reward for winning second place in the scale model event. Mark L. Haas, of the *American Boy* staff, is in charge of the party.

Regional champions from all parts of the United States and Canada took part in the Detroit contests. Charles Tong Nap, 12, champion of Hawaii, came alone; but *Chicago* sent 30; New York, fifteen; Dayton, ten; Toronto, ten; Buffalo, eight; Memphis, seven; and Providence, six. They drove much—used automobiles or rode in family cars, flew to Detroit by plane (at least 25 came by air) or came by train, bus or boat. They reached Detroit on Sunday, registered at the Hotel Statler, and immediately began building new planes or making spare parts for old ones. Many of them, hearing rumors of amazing performances, worked all night.

On Monday the outdoor contest and the outdoor fuselage event were completed at the Grosse Ile Airport, 25 miles away, where the champions were taken in big yellow buses. Inside the big hangar where the Navy's all-metal dirigible was built, two groups of indoor contestants flew their models. Queerly, Ehrhardt made his times of six minutes and 25 seconds in the outdoor and two minutes and four seconds in the fuselage event, and Thompson set his new record, all on the same day. Other indoor contestants tried all day Tuesday to better Thompson's time, and Goldberg came just twenty-three seconds short of it, but none displaced him.

On Monday evening Edsel Ford entertained the modelers at the Ford Airport. William B. Stout presided, and honor guests included Mr. W. Irving Glover, Assistant Postmaster General in charge of air mail; Charles Bowles, mayor of Detroit; William B. Mayo, chief engineer of the Ford Motor Company; and Major Gerald E. Brower, commandant of Selfridge Field.

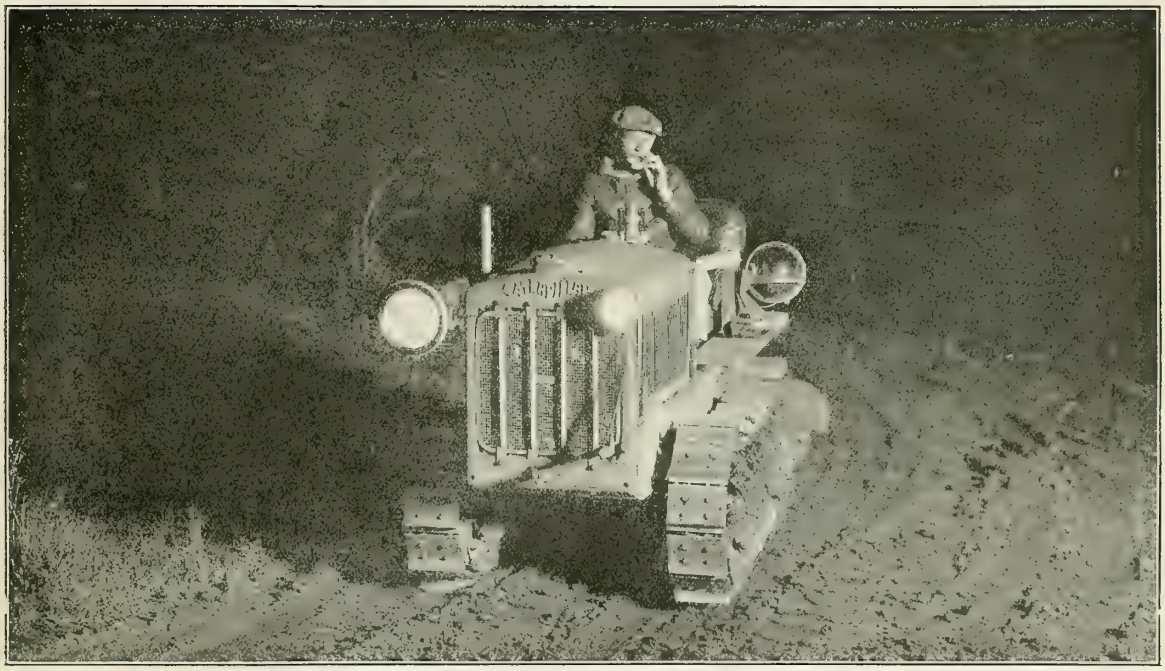
Tuesday the indoor trials continued, and Tuesday night Griffith Ogden Ellis, president and editor of the *American Boy*, was host at the wind-up banquet. Major Norman Imrie, of Culver Military Academy, was the speaker, and Laurie Y. Erskine and Frederic N. Litten, writers of flying fiction, were guests of honor. After the banquet Mr. Ellis, on behalf of the *American Boy* and the Detroit Board of Commerce, sponsors of the meet, awarded the trophies, cups, cash prizes, and special awards to the winning contestants.

The prize list included: three trips to Europe, two financed by the *American Boy* and one by the Stinson Aircraft Corporation; the Stout indoor and fuselage trophies and the national outdoor trophy, which are competed for annually under National Aeronautic Association rules; three scholarships provided by the Aviation Institute of the

(*Continued on page 150*)

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WESTERN NEWS

D. C. TO ESTABLISH WESTERN BRANCH OF AERONAUTICS

A BRANCH office of the Engineering Section of the Aeronautics Branch, Department of Commerce, will be established at Los Angeles, Calif., in order to expedite the examination and approval of designs of aircraft types, according to a recent announcement of Gilbert G. Budwig, Director of Air Regulation.

The office will be manned with sufficient personnel to handle the technical data on aircraft designs submitted for approval by manufacturers located in the Western portion of the United States. It is planned that the functions of the branch office will be practically the same as those of the main office in the Aeronautics Branch in Washington. All technical data will be submitted by Western aircraft manufacturers direct to the Los Angeles office instead of to the office at Washington, D. C.

Designs submitted to the Department of Commerce for approval are examined as to their compliance with the department's airworthiness requirements in order that aircraft manufactured under the approved drawings may become eligible for license.

Aerial Police Organized at Los Angeles

AN aerial police reserve unit has been organized at Los Angeles, Calif., in conjunction with the Los Angeles Police Department. The unit will be comprised of volunteers whose services and planes will be called upon in the performance of regular police duty. The division is similar to those organized at New York City and Detroit, Mich.

Organization of the unit, including the selection of a uniform for members and methods of mobilization, is being worked out.

Col. R. B. Barnitz will be commander of the Los Angeles aerial police with the rank of captain, the other members holding the rank of lieutenant. Woodruff DeSilva will be adjutant. Members of the unit include the following: George Noville, Waldo Waterman, Col. Roscoe Turner, Rufus Pilcher, W. E. Thomas, Jack Caris, Bud Campbell, Lieut. Henry Ogden and Paul Richter.

W. A. E. Receives Contract from Government to Patrol Western Forest Lands

MORE than 3,000,000 acres of national forest land in the Santa Barbara, San Bernardino, Cleveland, and Angelus national forests will be patroled by planes of the Aero Corporation of California, subsidiary of Western Air Express, during 1930 under a contract recently awarded that company by the Government.

The area in the contract extends from the southern boundary of San Luis Obispo County on the north, to the Mexican border on the south; and from the Mojave desert on the east, to the Pacific Ocean on the west.

Three planes of the Aero Corporation will be used exclusively in forest patrol service. The planes will be subject to call and ready to fly anywhere in the Southern California forest land.

The planes will fly over forest fires so that ground crews can be directed in battling blazes by a forest service observer.

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UNLICENSED pilots making a landing, forced or otherwise, at the new municipal airport, Fresno, Calif., will be arrested and their planes, if unlicensed, will be carted off the field, according to a recent announcement of officials of the Fresno airport. The field is located midway between Los Angeles and San Francisco.

First of a Chain of Branch Flying Schools Is Established at Santa Paula By Standard

NEGOTIATIONS were recently completed for the leasing of the Santa Paula flying field in the Santa Clara Valley by the Aero Corporation of California and the establishment there of a branch of the Standard Flying Schools. The school to be located at Santa Paula will be the first branch of a chain of flying schools announced several months ago by the Standard Flying Schools.

Construction and improvements have been commenced at the Santa Paula field, according to an announcement of Paul E. Richter, Jr., vice president and general manager of the Aero Corporation of California. Lowell Lamoreaux, former Army flying instructor who has been affiliated with the Standard Flying Schools at Los Angeles for the past several years, will be in complete charge of the school branch and Aero Corporation operations at the Santa Paula field.

Construction of a combination administration building and hangar at the field is nearing completion and will house the present equipment of the new school and other Aero Corporation activities. This building is in addition to six hangars already erected at the Santa Paula field.

Plans for the establishment of other branch schools are being completed by the school division of the Aero Corporation of California. The Standard Flying Schools at Los Angeles will serve as the advanced training school.

ALL monthly records of the Western division of T.A.T.-Maddux Air Lines were broken in June, according to a recent announcement of H. W. Beck, traffic manager. The division carried approximately 500 more passengers than in any previous month.

Twenty-four double or triple sections were used during June. On all other regularly scheduled flights, the planes averaged about eighty per cent capacity.

ARRANGEMENTS to add four eight-passenger Fokker amphibion monoplanes to the fleet of Air Ferries, Ltd., were announced recently by Joseph J. Tynan, Jr., president of the company. The first ship, which has been under test in the San Francisco bay district for the past month, has been delivered and is now in service. One sister ship will follow immediately from the factory at Hasbrouck Heights, New Jersey, and two others have been ordered.

SETS NEW WOMAN'S ALTITUDE RECORD

APPARENTLY a new woman's international light airplane altitude record was established at San Diego, Calif., July 11 by Miss Ruth Alexander who flew a Barling NB-3 monoplane to a height of about 26,000 feet. The flight was observed by William Van Dusen of the National Aeronautic Association and a sealed barograph carried in the plane has been sent to Washington, D. C., for official homolgation. The plane was powered with a Warner Scarab engine of ninety horsepower. No supercharger was used.

Miss Alexander took off at 1.33 p.m., and landed at 3.48 p.m. It required two hours and seven minutes to reach the maximum altitude and eight minutes to descend to the ground. A minimum temperature of 9 degrees F. was encountered.

The flight was Miss Alexander's fourth attempt to establish an international altitude mark for women. In November, 1929, she reached a height of 18,000 feet; where she was turned back as the result of severe cold. Miss Alexander tried again on July 4 of this year, climbing to more than 20,000 feet. The barograph carried on this attempt was calibrated to only 20,000 feet. On her third attempt which was made July 10, engine trouble at the take-off prevented the flight.

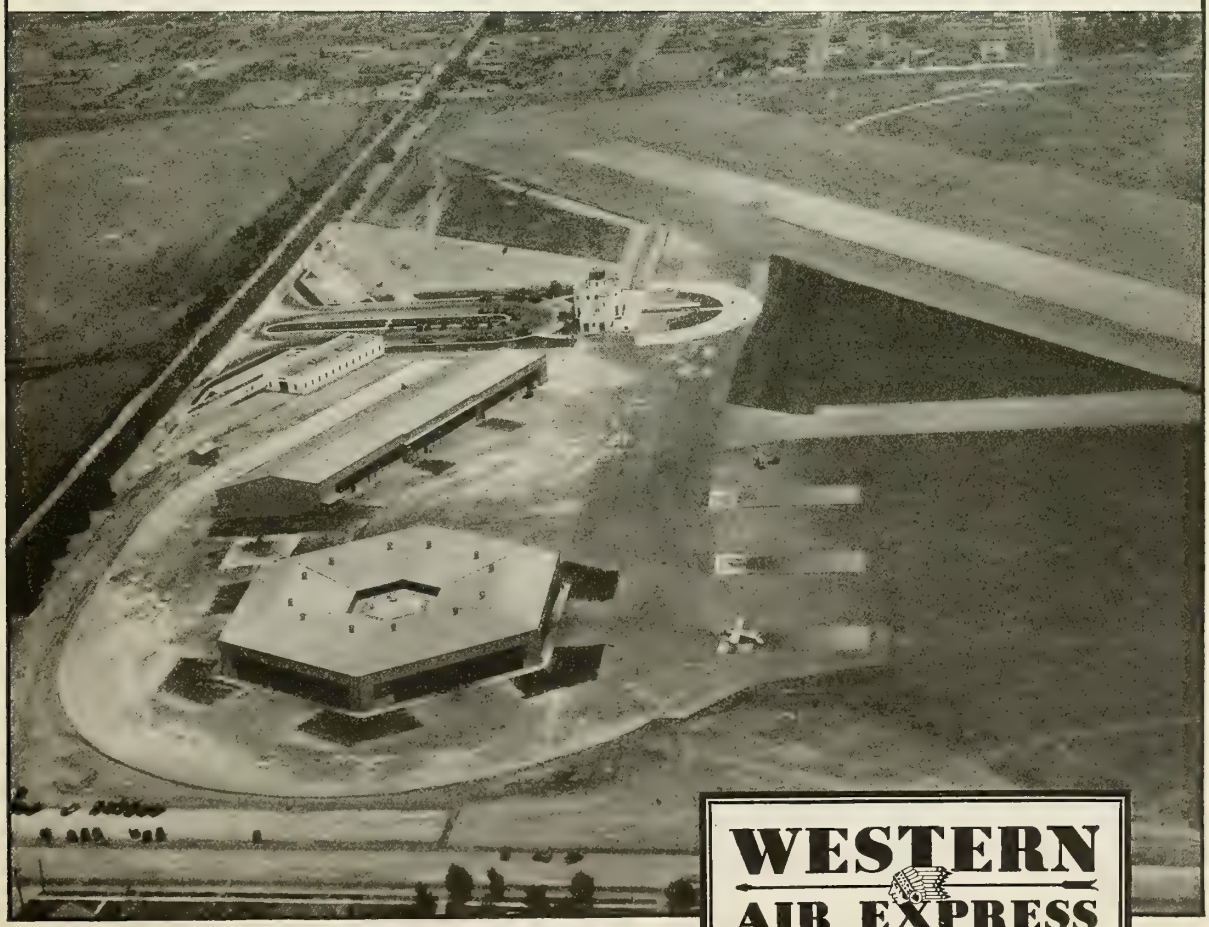
Home Port

of the

World's Largest Overland Air Liners



SUCCESSFUL air transportation depends, in no small measure, upon the ground plant that serves the air liners. This truth is responsible for the building of the new million-dollar airport of the Western Air Express at Los Angeles. Here are located the shops and hangars that keep in prime condition the fleet of giant passenger air liners, among them the world's largest overland airplanes. In the port's beautiful passenger depot is located the heart of the wide-flung weather-reporting system and the plane-to-ground communication system that controls the operation of more than 16,000 miles of scheduled flying every day. It is this careful control that has made possible the unsurpassed four-year record of Western Air Express for dependable passenger transportation. Airmen...and the general public...are invited to inspect the airport as our guests.



WESTERN AIR EXPRESS

TEST HIGH-WING EMSCO FOR TRANS-PACIFIC FLIGHT

THE Emsco Aircraft Corporation of Downey, Calif., has constructed a special high-wing monoplane which will be used on a projected trans-Pacific flight to Tokio, Japan. The ship has been named the *City of Tacoma* after Tacoma, Washington, the metropolis from which the flight is scheduled to start. In preparation for the flight, the Emsco company has been conducting experiments to determine the performance of the ship.

Among the more important of these were the full load tests recently made at Muroc Dry Lake Calif., which has an elevation of 2,400 feet above sea level. Particular attention has been given to its take-off run with a full load. In the tests made at Muroc Dry Lake, the plane got into the air after a run of 1,710 yards. Its gross weight was 11,340 pounds. When the *City of Tacoma* takes off on the trans-Pacific flight, approximately 1,100 gallons of gasoline will be carried. This will make a gross load of about 1,200 pounds. It is estimated that the cruising range of the plane will be more than 5,500 miles when loaded for the Tacoma-Tokio flight.

This ship has a gasoline capacity of 1,120 gallons of gasoline and fifty gallons of oil at sea level. It is provided with flight instruments and the equipment includes a radio sending and receiving apparatus. The fuselage is constructed of chrome-molybdenum tubing throughout, including the tail section. The wing is built of spruce spars and ribs reinforced with sixteen chrome-molybdenum steel compression members braced with solid steel rods. The wing span is sixty feet and the chord is nine foot.

The power plant of the Emsco high-wing monoplane is a Wasp engine of 425 horsepower.

W.A.E. Operations at San Francisco Bay Airdrome

WESTERN Air Express recently started operations from the San Francisco Bay Airdrome, according to an announcement of C. W. H. Smith, general traffic manager. Passengers arriving in the thirty-passenger planes of W. A. E. are five minutes distant from Oakland, Berkeley and Alameda, and fifteen minutes by Air Ferries, Ltd., or twenty-five minutes by boat to San Francisco.

The field, partly owned by Western Air Express, was developed at a cost of $500,000. The field is comprised of 232 acres of flat land, fronting Webster Street. There are 110 acres of land adjoining the field, for possible expansion.

The airport is provided with shell runways, developed at a cost of $60,000. The east and west runways are 400 feet by 3,100 feet; and the north and south runways are 200 feet by 1,700 feet. The taxi strip is 80 feet by 1,800 feet and the take-off strip of asphalt concrete is 18 by 1,800 feet. The administration building is 440 feet by 120 feet. All offices of Western Air Express, West Coast Air Transport and Air Ferries, Ltd., air transport lines using the field, are located in the one building. One end of the structure is reserved for hangar and repair facilities.

R. U. St. John is manager of the San Francisco Bay Airdrome. He served as a pilot in the Air Service during the World War, and was formerly associated with the sales and maintenance aviation department of the Standard Oil Company.

AIR FERRIES, LTD., recently transferred its Oakland terminal from the foot of Franklin Street to the newly completed San Francisco Bay Airdrome at the Alameda end of the Oakland-Alameda tube. The new terminal places Air Ferries within five minutes of the business center of Oakland and within four minutes of the West Alameda business district by motorbus. Pier 5, the downtown San Francisco terminal, is six minutes away by air.

Free taxi transportation from the Airdrome to Fourteenth and Broadway Streets in Oakland has been inaugurated by the company. Connections will be made with every plane. According to the announcement by Joseph J. Tynan, Jr., president of Air Ferries, Ltd., this is the first step in plans to furnish free motor bus transportation at all Air Ferries terminals.

Construction of an Air Ferries passenger terminal building has been completed at the airdrome. The entire fleet of five planes, which will shortly be increased to eight, will base at the Airdrome. Air Ferries will have 15,000 square feet of building space, including 3,000 feet for its shops. Lighting facilities for night flying, a teletype weather reporting service and free parking space for 2,000 automobiles are provided the company at the new terminal.

THE reduction of air passenger rates, inaugurated in November, 1929, by Western Air Express, will remain in effect indefinitely, according to a recent announcement of C. W. H. Smith, general traffic manager. No upward or downward revision in the rates is contemplated for the near future.

THE most recent product of the Commercial Instrument Company, of Los Angeles is a weather watch barometer of the liquid expanding type. The instrument may be used as an altimeter and for general commercial purposes. The readings on the rising side of this barometer indicate windy, fair and changing weather. On the falling side the readings include dry, rain and storm. Production will be started September 15, according to the company.

CONTACTS

[FRANK E. SAMUELS]

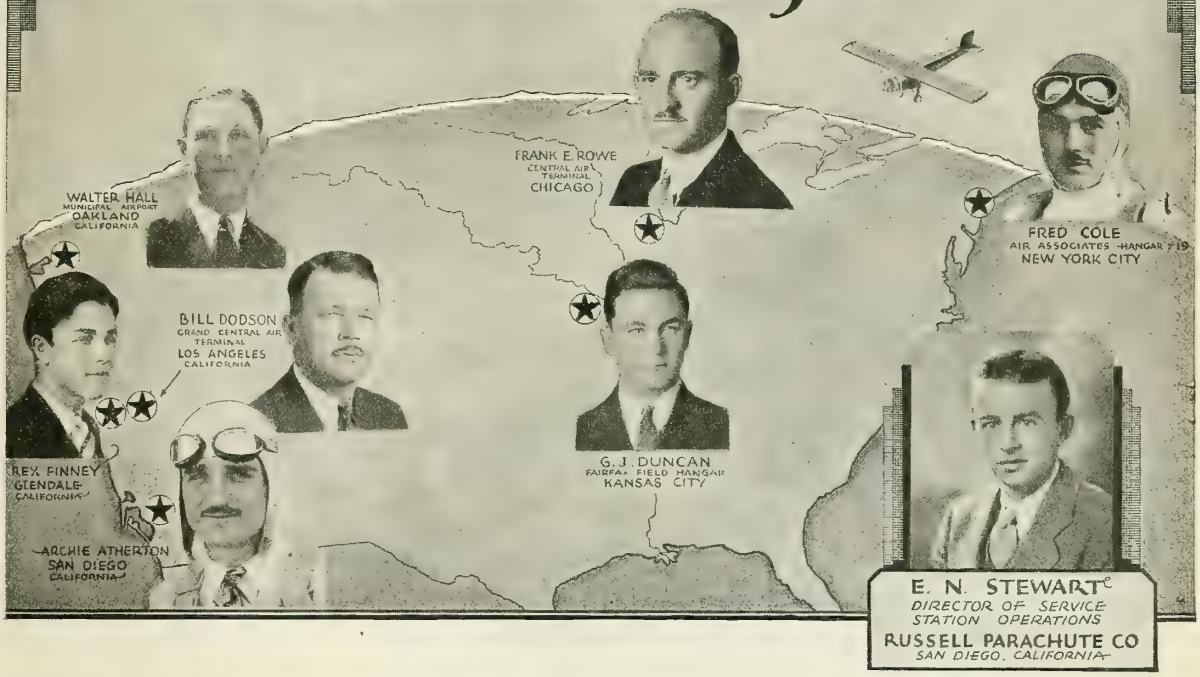
A CAVALCADE of sixteen planes flying in formation and led by Florence Lowe Barnes, landed at the Grand Central Airport, Glendale, July 1. They will make their base of operations at the hangar recently leased by H. C. Lippiatt, Southern California Travel Air distributor. Among those who made the flight and are now tenants of Mr. Lippiatt are Wallace Beery and Vic Fleming, those two popular movie stars. Wally Beery flew his new Wasp-powered Travel Air cabin plane, followed closely by Vic Fleming, also flying a cabin Travel Air. Florence Barnes led the procession in her new single-place racing plane, built by the Travel Air company to compete in the women's cross-country derby at the National Air Races. The Ruxtell Corporation moved their entire equipment into a large shop at one end of the hangar.

(*Continued on next page*)



High-wing monoplane constructed by Emsco Aircraft Corporation for use on projected trans-Pacific flight.

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Inspecting
Re-packing
Drop Testing
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all makes of Parachutes



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THIS Organization of Experienced Parachute Service Men is Now Available to Flyers Throughout the Country.

These experts, thru actual experience, factory training or long association with standard types of aerial life-saving equipment, probably know more about the care and use of parachutes than any other group of men in the aeronautic industry. It is significant, therefore, that they have selected the Russell "Lobe" Parachute as the principal equipment they will feature in their new Parachute Sales and Service Stations established in various parts of the Nation for the convenience, comfort and safety of flyers everywhere.

In their independently owned and operated service stations, these experts will service all types of parachutes. They are eminently qualified to do this; most of them having years of experience with all standard makes of parachutes. All of them have had factory training at the Russell Parachute factory. . . . . and now their knowledge and experience is at your command. Call on any one of them in the near future and learn more about the care, use and advantages of parachutes—the information they can impart may prove invaluable to you, as it has to many others. This month they are featuring and exhibiting the new Russell Lobe "Quick Attachable" Parachutes.

Russell Parachute Company

1202 Kettner Blv'd : San Diego, Calif.

Eastern Sales Office: 122 East 42nd Street, New York City

Russell "Lobe" Parachutes are available in convenient "quick attachable" packs for cabin planes; "detachable back-pads" for open cockpits; also lap, seat and back packs. Choice of silk, pongee silk or cotton materials. Prices from $250 up. Send for descriptive folder.

RUSSELL "LOBE" PARACHUTE

(Contacts continued)

AMONG the planes which recently received Department of Commerce Approved Type Certificates are the Hodkinson and the Ogden Osprey, both trimotor cabin planes. Both of them are Southern California products designed and built in Los Angeles.

THE Tru-Vane Neon illuminated wind T recently installed at the United Airport, Burbank, is spoken very highly of by pilots flying over or making landings at the airport at night. It resembles an airplane in appearance, with neon lights on wings and fuselage. Revolving as it does with the wind, it is seen at high altitudes and through ordinary fog. The T is twelve feet by sixteen feet overall.

A MERGER of insurance companies that should be of interst to the industry was recently effected. The Behrendt-Levy company and the L. P. Rosen company have joined hands under the name of The Behrendt-Levy-Rosen Insurance Company. The Behrendt-Levy company was among the first on the West Coast to write aviation insurance and has been very successful in that branch. The L. P. Rosen company is well known throughout this territory. Mr. R. A. Trow has been appointed general manager of the aviation department of the combined companies.

A NOVELTY in the aviation industry that is drawing not only a crowd of curious onlookers but is interesting all pilots and student pilots is the little "Cycloplane" Powered Trainer. While passing the Lincoln Airport recently, I noticed a line of not less than fifty automobiles along the fence and a large crowd on foot watching the little trainer ground flying around the airport. The designers and builders invite pilots or student pilots to fly the ship. There is always a crowd waiting to get in and fly around the airport. It is impossible for the ship to leave the ground. Those who ride in it say they have the sensation of actually flying in the air while moving around the airport on the ground. The controls are the same as those used on a standard powered plane.

THE boys at Clover Field put on a local meet July 4-6, drawing a crowd of over ten thousand spectators each day. Slow speed races, speed races and balloon busting contests open to women, dead stick landings and races open to the owners of aircraft who keep their planes at the airport, made up a daily program.

CALIFORNIA

ORGANIZATION of an aviation division of the Los Angeles Fire Department was announced recently by Fire Chief Scott. The unit would have a membership of 250.

The division will be used to survey surrounding territory and combat brush and forest fires in this area. Members of the fire department desiring to engage in this branch of work will be instructed by E. J. Crosby.

A COMMERCIAL aerial ambulance was placed in operation recently by the California Aerial Transport and will be kept on call at the company's hangar at Los Angeles Municipal Airport. The ship utilized for this purpose is a Lockheed Vega powered with a 425-horsepower Wasp engine.

Equipment for the plane includes a first aid cabinet, stretchers, waste receptacles, hot pads, rubber blankets, blankets, sheets and pillows, supplied by E. D. Bullard Co., distributors of safety equipment. The equipment is installed in the closed cabin of the plane, a form-fitting bed being suspended from the roof, so that it will remain level during flight. Accommodations are provided for pilot, doctor and nurse.

TESTS of an Ogden Osprey equipped with Goodyear Air Wheels have been completed, according to a recent announcement of Wendell Shore, assistant manager of the Ogden Aeronautical Corporation of Inglewood, Calif., manufacturers of the ship. The conventional shock absorbing struts have been eliminated in this installation and a rigid tubular member has been used to facilitate the absorption of taxying and landing loads in the wheel itself. The size of the tire is thirty inches by thirteen inches. The tail wheel is twelve inches by five inches. This equipment is made by the Goodyear Tire and Rubber Company.

The company will continue the distribution of the Ogden Osprey provided with Bendix wheels used in conjunction with shock struts as standard equipment. The Air Wheel installation will be offered for operators using muddy and sandy fields.

A TOTAL of 847 passengers were carried by planes operated at the Los Angeles Airport, Inglewood, Calif., during June, according to a recent report covering operations at the field during this period. This is in comparison with 750 passengers carried during May. A total of 6,172 landing was made during June as compared with 5,900 landings during the previous month. Nine hundred student flights were made in June as compared with 898 flights in May.



Ogden Osprey equipped with Goodyear air wheel installation

OAKLAND

[H. V. Waldorf]

The Pacific Coast Aeronautical Exposition at Oakland

THE Pacific Coast Aeronautical Exposition was held at the Oakland Municipal Airport June 28-July 6. The *Southern Cross* landed at the field on July 4 at the end of the round-the-world flight. More than 150,000 persons attended the exposition.

The exposition included a daily aerial program and aeronautical exhibits and lectures. The exhibits were held in a huge tent located at the west end of the hangar line. There were fourteen airplanes and three gliders on display.

D. C. Warren, Tommy Symons, and Tom Penfield were winners in the daily races. Daily exhibitions of inverted flight were given by Paul Mantz in a Kinner-powered Fleet. Night flights in a plane equipped with flares were made by Lieut. Col. Harry Abbott of the Berkeley Aviation Services, Ltd.

During the exposition, four girls who had not had previous instruction were taught to fly. They made their solo flight on July 6. The Goodyear blimp *Volunteer* participated in the ceremonies opening the show.

A new short cut to the flying field was opened June 28, the third anniversary of the airport.

The show was sanctioned by the Aeronautical Chamber of Commerce of America and was sponsored by the Capt. Bill Erwin Post of the American Legion; the Junior Chamber of Commerce; and the Aero Club of Northern California. William P. Bulter was managing director.

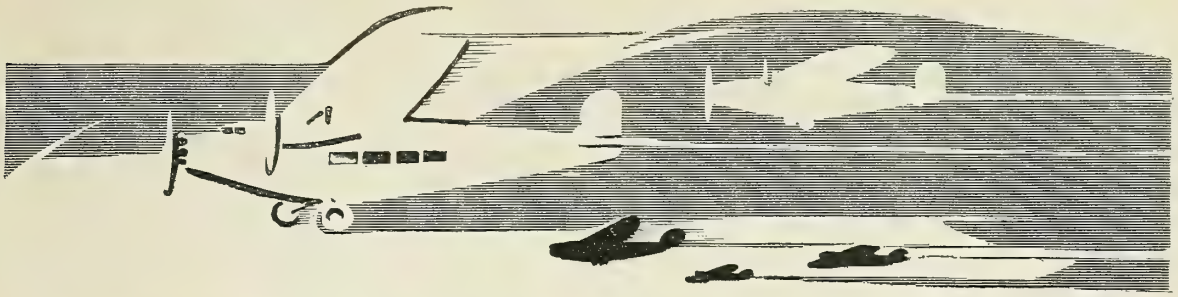
THE Boeing School of Aeronautics sent its hooded cockpit plane on a 5,000-mile tour of the Western States during June. The plane is used to instruct students in instrument flying. George Myers, chief of flying instruction at the school, piloted the plane. Demonstration flights were given on the journey. Stops were made at Phoenix, Denver, Cheyenne, North Platte, Omaha, Des Moines, Chicago and other Middle Western cities.

WILLIAM MOORE, Federal aeronautics inspector at Oakland Municipal Airport, has been appointed school inspector for the Western States. Wiley Wright has succeeded Moore at the Oakland airport bureau.

AWARDS in the W. E. Boeing Aviation Scholarships in the Boeing School of Aeronautics at Oakland Municipal Airport were recently announced by T. Lee, Jr., general manager.

Richard James Moore of Sacramento, Stanford University, was awarded the master pilot course; R. H. Spellman, Mt. Union College, Canton, Ohio, master mechanic course; John Sharp, University of Nebraska, private course; and J. W. Harris, Univers-

(Continued on next page)



More air transport miles daily than any other gasoline





HERE is the supreme test of any motor product...the grueling test of day-in-and-day-out transport service! It takes power and speed, perfect carburetion...a gasoline of the very highest quality and uniformity. ¶ It is significant that more miles are flown daily with Richfield in this service than any other gasoline made. The great air lines including . . . Western Air Express, T.A.T.-Maddux, Pan-American Airways, Standard Airlines, Mid-Continent Air Express, West Coast Air Transport . . . rely on Richfield in the maintenance of uninterrupted schedules. ¶ The qualities that make Richfield the choice of the world's great air lines . . . are every bit as essential in your own plane for normal flying . . . or sudden emergencies.

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(Oakland News continued)
ity of Nebraska, private course; and J. W. Harris, University of Washington, private course.

A total of 173 colleges and universities participated in the competition. The committee of award was headed by Prof. Baldwin M. Woods of the University of California.

A SUMMER course for high school and college teachers desiring instruction in aeronautical subjects was opened at the Boeing School of Aeronautics at the Oakland Municipal Airport July 7. The session terminates August 8.

SAN DIEGO

DOUGLAS T. KELLY has been appointed field manager of Lindbergh Field at San Diego. He will carry on this work in addition to his duties as general superintendent of the Airtech School of Aviation.

NIGHT flying at Lindbergh Field, San Diego, Calif., has been facilitated by the installation of sixty-three obstruction lights marking the boundaries of the field. Grading and surfacing of the field is progressing, with ninety acres graded and fifty acres being worked on. Plans call for four runways, each 500 feet wide and 2,500 feet long, and the erection of an $80,000 administration building.

PENNY-A-POUND passenger hops inaugurated by Airtech Flying Service, Ltd., Lindbergh Field, San Diego, two months ago have attracted 1,275 passengers. This rate is in effect on Saturdays and Sundays only. Women and children pay one dollar each.

[L. M. EARL]

FIFTEEN gliders participated in a three-day meet and Governmental inspection at Moreno, near here, July 4-6. Exhibition flights and tests were made. Most of the gliders were privately constructed and were given their first tests for airworthiness by the Department of Commerce.

A NEW glider club has been formed at San Diego by H. M. Clark, Byron Woods and L. M. Earl of the Bowlus Sailplane factory. A new model Bowlus combination sailplane and trainer equipped with the short center section is to be purchased and will be used for all training and soaring.

A HYDRO-GLIDER school will be opened at San Diego by H. G. Chapman. The school will be located at Coronado Beach A Bowlus sailplane equipped with dual pontoons for training will be used. A watertight boot will be fitted over the fuselage for soaring purposes with the pontoons removed.

THE Bowlus Sailplane Company of San Diego opened a special summer session in sailplaning July 15 at the factory and school in San Diego. The course will consist of instruction in meteorology, aerodynamics, construction and flight training.

ARIZONA

[H. G. WILSON]

APACHE Airlines, operating between Phoenix and the Globe-Miami district, is planning an extension of its line to Prescott in the near future. Lieut. R. D. Vaughn, general manager of the company, recently visited Prescott to make preliminary arrangements for the lines.

THE Tucson Air Service has been formed by George Hoffman and Olin Coulter. Two Waco planes for training and taxi work are maintained at the municipal field. LeRoy Severance is chief pilot for the company.

A $50,000 air mail radio station will be constructed at the Tucson municipal airport by the Department of Commerce. The station will supplement the U. S. Army radio and meteorological station already at the field. George D. Barr, assistant airways engineer, was in Tucson during June and secured a lease on property for the station. Two 125-foot steel towers will be erected for the voice radio communication and three sixty-foot wood masts will be erected for the point-to-point communications. When completed, the station will broadcast weather information to planes flying in the vicinity and to other stations of the Department of Commerce along this route.

AN air club for Negroes has been formed at Phoenix. The club is known as the Bessie Coleman Aero Club, and is planned as the parent organization for similar units in all parts of the country. The club has three planes. Herman Banning is chief pilot.

WASHINGTON

[C. M. LITTELJOHN]

AN airport will be developed at Pacific Beach, Wash., by the Commercial Club of the city, a beach and summer resort located on the Pacific Ocean. The club will start work on this landing field in the next few weeks.

WALLA WALLA, Wash., plans to have its own airport, to be operated by the city commission, with the assistance of an airport commission. The commission will make $60,000 available for the purchase and development of the field, and is having bonds for this amount printed.

FORTY workmen have been requested by King County Engineer Thomas Hunt to start the removal of the large Army hangar at San Point, north of Seattle, to the municipal airport in the south end of the city. A large site has been cleared for the re-erection of the hangar.

AN airplane field in the Olympic mountains at Low Divide, Wash., has been given official sanction by W. J. McKenzie of the Department of Commerce. He recently inspected the site and approved the field as a convenient emergency landing place for Federal forest patrol planes as well as regular passenger planes in summer. The trip by plane from Gray's Harbor requires one hour, as compared with two days by pack train.

COMPLETION of the first year of operation was recently celebrated by the Seattle-Bremerton air ferry. During this period planes of the company have carried more than 25,000 passengers across Puget Sound between Seattle and the Navy Yard city. About 100,000 miles were flown in the completion of 2,700 round trips.

GROWTH of its extensive air operations has caused the Navy Department to enlarge the Naval Air Base at Sand Point, north of Seattle. The acquisition of thirty additional acres of land will be made at a cost of about $50,000. The surface will be graded and new runways constructed.

UTAH

[G. PERRINS]

SEVERAL of the smaller airports in Utah are being improved this summer. At Richfield, Mayor F. G. Martines has announced that the new municipal airport has been developed to accommodate any size aircraft. The city spent $300 on recent improvements, after the acquisition of a 242-acre tract. Springville has graded the airport located there.

Recommendation that Provo secure sufficient land for a fine airport is being urged by clubs and leading citizens. W. J. McKenzie of the Department of Commerce will assist city officials in making plans for the establishment of the field.

The executive committee of the Logan-Cache airport has named A. G. Olofson as its first chairman. Improvements being planned at the airport include the extension and conditioning of the runways and the establishment of a marker in the center of the field.

Ogden plans many improvements at its airport. Four large runways are to be lighted, green lights designating each particular runway. Only commercial aircraft and airmen licensed by the U. S. Department of Commerce will be permitted to operate in this city, if an ordinance now being considered is passed. Penalty for violation of the ordinance is a fine of not more than $299 or not more than six months' imprisonment.

GILBERT T. RICH, airport manager of the municipal airport, Salt Lake City, spoke recently on "The Past and Future of Aviation and the Effects of Airports on Thriving Communities."

COOPERATION of airplane pilots in cutting down huge timber losses in the West through forest fire is being sought by the forest service, Blaine Betenson, assistant supervisor of the forest area here, has announced. All commercial airlines have been requested to ask pilots to report by radio all fires discovered while flying regular routes.

(*Continued on next page*)

WESTERN UNION

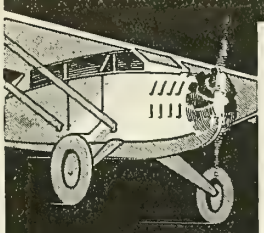
J V G POSEY POSEY MFG CORP
SPARS USED IN HUNTER BROTHERS STINSON DETROITER WERE POSEY SPARS STOP PLANE WAS DELIVERED EARLY IN NINETEEN TWENTY EIGHT AND PRIOR TO ENDURANCE FLIGHT HAD FLOWN SEVENTY FIVE THOUSAND MILES STOP FIRST USED IN COMMERCIAL SERVICE OUT OF CHICAGO STOP CONGRATULATIONS ON MANNER YOUR MATERIALS MEET EXACTING DEMAND OF COMMERCIAL SERVICE AND GRUELLING TEST OF RECORD BREAKING FLIGHT
E STINSON STINSON AIRCRAFT CORP

POSEY SPRUCE WING BEAMS
in the City of Chicago

THE Hunter Brothers' flight is the latest of a long line of record flights in which Posey Spruce wing beams played an important part. Posey Spruce wing beams were used in Colonel Lindbergh's Ryan, *Spirit of St. Louis;* Art Goebel's Travel Air, *Woolaroc;* Schlee and Brock's Stinson, *Pride of Detroit;* Byrd's north-pole Fokker, *Josephine Ford;* Reinhart and Mendel's Buhl, *Angeleno;* Jackson and O'Brien's Curtiss-Robin, *St. Louis Robin.* Our Spruce wing beams were also used in the Travel Air in which Walter Beech won the first reliability tour. They were used in the Waco which took first place the following year, as well as in countless planes now unheralded but making aviation history just the same.

POSEY MANUFACTURING COMPANY
Hoquiam, Washington

AIRCRAFT INSURANCE

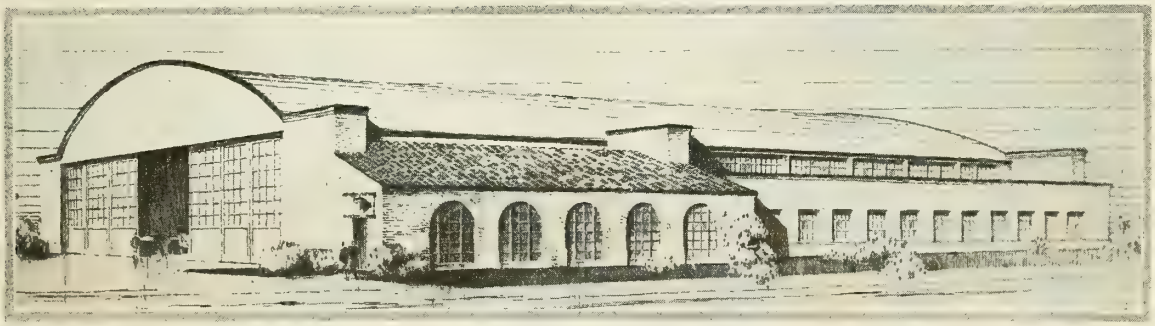


Life . . Fire . . Theft . . Cargo
Property Damage . Windstorm
Compensation . . . Accidental
Damage . . Personal Accident
Ground Property Damage . . .
Public and Passenger Liability
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Liability . . . Delivery Flight
Blanket Policies . . . . . .

AIRCRAFT FINANCE

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INSURANCE EXCHANGE BUILDING
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LOS ANGELES, CALIFORNIA



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(Utah News continued)

STATE regulations patterned after Department of Commerce rulings governing the flying of airplanes are being urged by Chamber of Commerce aviation committeemen of Salt Lake City.

IDAHO

[G. PERRINS]

WITH the approach of the tourist season, Southern Idaho cities and towns have started the improvement of their airports and additional ones are planned, A. C. Blomgren, State aeronautics engineer, reports. He made an air trip to McCall recently to plot an emergency landing field at Banks.

THE city of Arco is improving its airport. Burley dedicated its new airport July 4. Challis recently completed an airport which will be used both by Sawtooth mountain tourists coming in by air, and by the forest service in spotting fires in the remote Salmon-Idaho forest section.

PANORAMIC AIRWAYS COMPANY is seeking a location on the highway near Shelley for an emergency landing field to use in its inter-park service. Engineer Blomgren has started negotiations with the forest service for the establishment of a field near Yellow Pine, in Valley county.

NORTHWEST

THE Rankin School of Flying, Rankin Flying Service and Rankin Aircraft Corp., were recently purchased by the Tex Rankin School of Flying, Inc., Portland. The new company is capitalized at $50,000, and seventy per cent of the capital stock is owned by Tex Rankin and his brother, Dick Rankin.

A few changes have been made in personnel, and new flying equipment has been purchased. Model F Wacos, Kinner-powered, have been ordered and will be used as primary training planes. School buildings, shops and an office and administration building will be erected at the Rankin Airport.

Tex Rankin recently celebrated his tenth anniversary in flying school activities. During this period approximately 800 students have been soloed and several hundred have taken flight instruction without a serious accident.

The company recently sold new Waco planes to Burton Davis of Bend, Oregon; F. H. Christensen and Henry Raasina of Portland; Jack Dalton of Walla Walla, Wash.; H. Branhill of Lewiston, Idaho, and Eric Gunner and G. M. Baker of Kimberley, British Columbia, Canada.

[F. K. HASKELL]

ALFRED MAILING, president of the Aerial Express Corporation, Ltd., has announced the inauguration of a new plane service to cover the route Portland, Los Angeles and other major Pacific Coast cities, effective July 1. It is planned to provide service every other day.

Los Angeles and Seattle will be the terminals of the line. It is planned to open later a feeder line between Portland and Spokane.

This new express service will enable Portland florists to put choice Oregon roses on the market while they still are as fresh as when cut. This is only one type of freight which will be carried.

PORTLAND fliers won the majority of events at the dedication of the airport at Kelso, Wash. Dick Rankin and Art Walters, Portland, won the relay race; Steve Mills, Portland, was first in the fifteen-mile race, time 6:10; Dick Rankin was second, time 6:20 and Ingwald Iverson, Seattle, was third, time 6:5.

Rankin and Mills tied in the stunting contest with Norval Norton third; Bert Rouff won the bombing, making a direct hit on his fourth try. Russell Lawson, vice governor of the National Aeronautic Association, was referee.

A THREE-HOUR weather reporting service has been inaugurated at Baker, Ore., especially for planes traveling the Pasco-Salt Lake route. An intermediate hourly service is expected to be placed in operation in the near future. Intermediate stations will be established between Pasco and Boise at Pendleton, Mecham, LaGrande, Pleasant Valley and Huntington. Teletype equipment will be installed at each point.

COLORADO

Third Annual Pikes Peak Air Mee

TO test efficiency and climbing qualities of planes under Western service conditions, sponsors of the third annual Pikes Peak Air Meet to be held at the municipal airport, Colorado Springs, August 9-10, plan an airplane race over the summit of Pikes Peak, according to a recent announcement of officials of the Pikes Peak Aeronautique, Inc., a group of business leaders sponsoring the event.

The Pikes Peak flight will require an eighteen-mile journey from the airport to a point over the summit and return. As the airport lies 6,200 feet above the sea level and the peak summit is 14,109 feet, planes must climb more than 8,100 feet before starting the return dive to the airport. A formula basis will equalize chances for low and high-powered ships. More than forty airplanes have previously crossed the summit, but never in an organized competition. The event will take place in the morning or evening so that pilots will not be inconvenienced by bumpy air.

Cash prizes aggregating $1,000 will be awarded the winners of the annual "On to Colorado Springs" race preceding the meet. Prizes will be granted on an efficiency basis, as follows: First, $500; second, $250; third, $150; fourth, $100. A total of $550 in cash prizes will be awarded in closed course events for airplanes and gliders.

An allowance of five cents per mile will be given all entries who fail to win cash prizes in the "On to Colorado Springs" race.

WHEN Leo McGehee landed at Picketwire, Colo., recently with a plane of Mid-Continent Air Express loaded with passengers, it was the first time a plane had come down in the vicinity. When he landed again a few days later with another plane, the citizens of Picketville decided they needed an airport. The entire population of about thirty inhabitants turned out, cleared away the cactus, laid out a circle and erected a wind sock. The field comprises about 30,000 acres of practically level landing area. So far no hangars have been erected. The town is thirty miles from the nearest railroad.

IF IT FLIES—WE HAVE IT

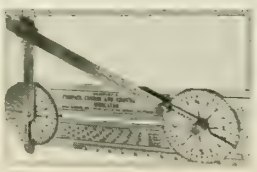
50 complete Libertys, $100 to $200. 35 Hisso A's, $150 to $250. 2 new 9 cylinder Siemens-Halske motors, 125 h.p., $875. 10 new A 7A, 4 cylinder Hall Scott motors, $175. 15 OX5's, $200 to $350. OX6's, $375. Anzani 80 h.p., $400. New 3-cyl. Szekely with Hamilton propeller, $450. 2-J4B Wright Whirlwind motors, guaranteed perfect condition, $550 each. One new C-6 and 3 K-6 motors at a bargain. B. M. W., Mercedes, Renault, Hisso H, Le Rhone and all types of motors and parts at reduced prices.

Highest grade $7 helmets, $3.75. $5 helmets, $2. Protector goggles, $5.50. D. H. clincher or straight-side wheels, $8. Small turnbuckles, 15c. Cloth, 30c yard. Dope, $1 a gallon, container and shipping, 50c extra.

Champion, A. C., and various makes of spark plugs, 25c. Safety Belts, $2.25. 7, 8, 9, 10 and 12 cyl. Scintilla magnetos at half price. Govt. Spec. Plywood 1/32, 1/16, 1/8, 32c sq. ft.

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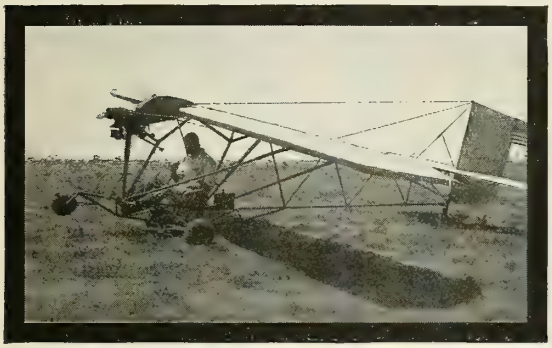
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No more guess work about your course. Know where you are all the time. Solves all your problems in a few seconds—Ground Speed, Air Speed, Compass Corrections, Wind Direction and Velocity.

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POWERED TRAINER



THE Cycloplane Trainer is powered with a 2 cylinder, 25 h.p. Cleone motor and is designed for the primary flight instruction of students. By not leaving the ground this new Trainer eliminates the hazards of early training.

The *green* student is taught the use of the controls one at a time. The first lesson concerns the use of the rudder with the wings locked to the landing gear. Next, the manipulation of the elevator control. And third, the aileron action is taught by unlocking the landing gear. The student is able to bank the Trainer without "lifting" it off the ground.

The controls give full maneuverability at such low speeds that the student soon learns the coordination of all three controls. The flexible landing gear gives him the sensation, even on the roughest ground, of actual flight.

The Cycloplane Trainer will fly hands off at 10 m.p.h., automatically setting itself in flying position, balanced and running on the two balloon wheels. The third wheel will prevent the ship from nosing over. The student actually solos after his first lesson in a powered craft. This will go a long way toward eliminating the mental hazard of the first flight.

The Cycloplane Powered Trainer is the biggest drawing card on the market today for prospective student pilots. It is perfectly safe to put a student who has never felt the controls of an airplane in the Cycloplane Powered Trainer. The action of the rudder, elevators and ailerons will come to him naturally. Give the prospective student a hop in the Cycloplane Trainer and he'll be sold forever on the idea that it's easy to fly.

SPECIFICATIONS and PERFORMANCE

Wing Span	25 ft.
Chord	5 ft.
Length Overall	18 ft.
Height	5 ft. 2 in.
Tread	4 ft.
Balloon Wheels	3x5
Weight Empty	250 lbs.
Power Plant	25 h.p. Cleone
Color	Diana Cream and Alexander Blue
High Speed in calm air	45 m.p.h.
Price	$895, f.o.b. Los Angeles

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Mr. OX5 OWNER

How many times have you turned to the classified columns of this magazine or any other aeronautical publication and, in reading the ads, noted the emphasis placed on the fact that the ship for sale had a *Millerized OX?*

In selling anything it is salesmanship to bring out the salient points of the article for sale, consequently the emphasis on Millerized OX motors.

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Supply Co.
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AERONAUTICAL INDUSTRY

WORLD FLIGHT OF SOUTHERN CROSS

A WORLD flight requiring more than two years was completed at the Oakland Municipal Airport, Oakland, Calif., last month by Wing-Commander Charles Kingsford-Smith in the *Southern Cross*, a rebuilt trimotor Fokker monoplane. In the course of this flight he completed the first flight from the United States to Australia across the Pacific Ocean; and a flight from Australia to England in thirteen days. On the trans-Atlantic leg of the world flight from Ireland to North America, Wing-Commander Kingsford-Smith completed the second flight by heavier-than-air craft from Europe to the United States; the third successful East-West crossing of the North Atlantic by heavier-than-air craft; and the second non-stop westward crossing by heavier-than-air craft.

The North Atlantic leg of the world flight was planned as a non-stop journey from Port Marnock, Irish Free State, to New York City. The plane took off June 23 at 10:27 p.m., Eastern Daylight Saving Time, en route for New York, equipped with radio sending and receiving apparatus and carrying Wing-Comdr. Kingsford-Smith and a crew of three. However, fog was encountered when off Newfoundland and the compass failed. Radio communication maintained with ships and shore stations guided the plane to a safe landing at the airport, Harbor Grace, Newfoundland, made at 5:55 a.m., June 25. The distance of about 2,200 miles was covered in thirty-one hours and thirty minutes. The *Southern Cross* took off from Harbor Grace for New York City at 4:05 a.m., June 26, and landed at Roosevelt Field, L. I., at 7:31 p.m., of the same day, covering the distance of 1,100 miles in about fifteen and one-half hours.



(P&A Photo)

(Left to Right) E. Van Dyk, Wing-Comdr., Kingsford-Smith, John Stannage and Capt. Saul

Wing-Comdr. Kingsford-Smith was accompanied on the trans-Atlantic flight by Evert Van Dyk, co-pilot; John W. Stannage, radio operator; and Capt. J. P. Saul, navigator. They flew the Great Circle route.

The second successful East-West crossing of the North Atlantic and the first non-stop crossing by heavier-than-air craft was completed April 13, 1928, at Greenly Island, Newfoundland, by the *Bremen*, on a flight of thirty-six hours and thirty minutes from Baldonnel, Dublin, Ireland. Capt. Köhl and Major Fitzmaurice piloted the plane, and Baron von Huenefeld was a passenger. They were later taken off the island by rescue planes. The *Bremen* was a Junkers type W33L powered with a 310-horsepower Junkers L-5 engine.

The first flight by plane from Europe to the United States, and the first successful westward crossing of the North Atlantic by airplane was completed by the United States Air Service in August and September, 1924. This journey was included on a 26,000-mile world flight from Santa Monica, Calif., to Washington, D. C., via Alaska, the Orient, Southern Europe, England, Iceland, Greenland, Labrador, Newfoundland and Nova Scotia.

The *Southern Cross* took off from Roosevelt Field, L. I., July 1 on a three-day transcontinental flight to Oakland where the round-the-world journey was completed.

The world flight started at the Oakland Municipal Airport, May 31, 1928, when the *Southern Cross* began a trans-Pacific journey to Australia. Wing-Comdr. Kingsford-Smith was accompanied by Capt. C. T. P. Ulm, co-pilot; Lt.-Comdr. Harry W. Lyon, navigator; and James Warner, radio operator. Stops were made at Honolulu, Fiji Islands and Sydney, Australia. The entire distance flown over was 7,800 miles in length, covered in eighty-eight and one-half hours of flying time.

On July 10, 1929, the *Southern Cross* landed at Croyden Aerodrome, London, England, ending a flight from Sydney, Australia, accomplished in thirteen days. The plane was piloted by Wing-Comdr. Kingsford-Smith, with H. A. Lichfield as navigator, MacWilliams as mechanic, and C. T. P. Ulm as passenger.

The *Southern Cross* was rebuilt from two Fokker planes made in 1926 by the Fokker Aircraft Corporation at the plant in Hasbrouck Heights, N. J. These planes were used by Sir Hubert Wilkins in his North Pole explorations in which they were seriously damaged in landings on the ice. They were brought back to the United States in 1927, and reconstructed into a single plane, the fuselage of one ship being rebuilt and the wings of the other being rigged to this fuselage. The three Wright J-5 engines which powered the *Southern Cross* at the start of the World flight in 1928 still remain in the ship.

Wing-Comdr. Kingsford-Smith was recently reported to have completed arrangements

Dear Mr. Tichenor:

I would very much like to use the medium of your publication to express on behalf of the other members of the "Southern Cross" and myself our gratitude for the sincere and courteous attitude of good fellowship that has been shown to us by the flying people of this country.

While I do not agree that our flights have necessarily merited the wonderful praise that has many times been bestowed, I nevertheless am human enough to enjoy a lot of gratification at hearing my fellow fliers say that it has been a good job.

Again with thanks for your courtesies and all good wishes, I am,

Yours very sincerely,
(Signed) C. KINGSFORD-SMITH.

Letter From Kingsford-Smith to readers of AERO DIGEST expressing appreciation for interest in his flight

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for a 9,900-mile flight from England to Australia in an effort to break the record of fifteen and one-half days established by Bert Hinkler in a light airplane.

He will use on this flight an Avro Avian powered with DeHavilland Gipsy engine. This plane has been equipped with special gasoline tanks giving a range of 1,700 miles. Stops en route are scheduled at Rome, Athens, Aleppo, Bushire, Karachi, Allahbad, Rangoon, Singapore, Batavia, Bima and Port Darwin.

Miss Earhart Sets Woman's Speed Record in Lockheed Vega

A NEW world's speed record for women of 174.9 miles per hour over a sixty-four-mile course was established by Amelia Earhart at Grosse Ile Airport, Mich., June 25. She flew a standard metal Lockheed Vega with no special equipment.

With a full load of 1,103 pounds, Miss Earhart averaged 171.44 miles per hour over the same course. The flights were observed by officials of the National Aeronautic Association.

Sergievsky Establishes Fourth International Seaplane Record

OFFICIAL homolgation of the world's altitude record of 26,368 feet for seaplanes carrying a payload of 500 kilograms (1,102.31 lbs.) established by Boris Sergievsky in a Sikorsky S-38 amphibion June 15 at North Beach, L. I., has been announced by officials of the National Aeronautic Association. This flight surpassed by 1,900 feet the world altitude record established in Germany by Fritz Harder, who flew a Junkers W-34 to 24,468 feet in 1928.

This is the fourth world's seaplane record established by Mr. Sergievsky within the span of four months; three for altitude, and one for speed with specified loads. On March 4, 1930, he flew a Sikorsky S-38 amphibion to 19,065 feet, setting a new world record for seaplanes carrying a payload of 2,000 kilograms (4,409.24 lbs.). The former record of 15,837 feet was established by Lieut. de Vaisseau of France, May 15, 1929.

On March 13, Sergievsky climbed to an altitude of 23,222 feet in a Sikorsky, setting a new world's altitude mark for seaplanes carrying a payload of 1,000 kilograms (2,204.62 lbs.). The former record was held by Franz Kneer of Germany, who flew a Junkers W-34 to 20,961 feet in 1928. On July 21 he apparently set a new record of 28,000 feet. This flight will be officially calibrated. On March 13, Sergievsky set a new world's record for seaplanes carrying a 2,000 kilogram-load over a closed course of 100 kilometers. Piloting the plane in which he set the new altitude record, he obtained a speed of 143.8 miles per hour, surpassing the record of 103.105 miles per hour established by Richard Wagner, a German, in 1928.

971 Planes Manufactured for Civil Use in First Six Months of 1930

THERE were 971 airplanes manufactured in the United States for civil use in the first six months of 1930, according to a preliminary report of the Aeronautics Branch of the Department of Commerce. The report is based on a record of Department of Commerce licenses and identification marks issued to new aircraft up to June 30. Planes for which applications for licenses were pending at the end of the six-month period are not included in the report.

Airplanes exported up to May 31 totaled 132 and planes delivered to the military services totaled 279. These are in addition to those manufactured for civil use.

The number of manufacturers producing one or more airplanes for civil use during this six-month period totaled 153. Twenty-two of this number produced ten or more planes. Gliders manufactured during the first six months of 1930 totaled 613.

Violations of Air Commerce Regulations Reported in Second Quarter

ONE hundred and seventy-seven violations of the Air Commerce Regulations were dealt with by the Aeronautics Branch of the Department of Commerce during the second quarter of 1930, according to a recent announcement of Gilbert G. Budwig, Director of Air Regulation. The total violations of the regulations for this period represented an increase of fifty-five over the first three months of 1930.

Fines totaling $900 were collected from fifty-three persons. Penalties, including twenty reprimands, sixty-three suspensions of Department of Commerce licenses, twelve revocations and five denials of licenses, were meted out for the violations. In twenty-four cases, evidence produced resulted in dismissal.

GORDON BENNETT BALLOON RACE

THE Gordon Bennett International Balloon Race and Aerial Carnival will be held at Cleveland, Ohio, August 31-September 1, sponsored by National Air Races of Cleveland and sanctioned by the National Aeronautic Association. After conferences with Cliff Henderson and Maj. "Shorty" Shroeder, managing director and air race chairman, respectively, of the National Air Races to be held at Chicago, Ill., August 23-September 1, plans for coöperation in the staging of the two events were adopted.

On August 30 a flower pageant will be held at Cleveland as a preliminary to the race and carnival. Ceremonies will include a parade in which the pilots and aides of all the balloons entered in the Gordon Bennett contest will participate.

The aerial carnival will start August 31 at the Cleveland Municipal Airport where lighter-than-air and heavier-than-air exhibitions will be given. The events on this day will include the Mixed Doubles Chicago-Cleveland Relay Race, held in conjunction with the National Air Races. Each team will be composed of one woman and one man pilot. The race will start from Chicago at noon, one pilot of each team being stationed at Cleveland for the return trip. A prize of $2,000 will be awarded the team winning first place and $1,000 the second.

The balloon race will start from the airport at 4 p.m. September 1, preceded by a series of aerial exhibitions. Entries have been received from Belgium, France and Germany, and it is expected that at least ten balloons will compete for the trophy.

Officers for 1930 International Gordon Bennett race are as follows: Capt. William Flood, U. S. Army, operations officer; Lieut. Charles Bausch, U. S. Navy, referee; Maj. Albert Bond Lambert, starter; Luke Christopher, secretary N. A. A. and Carl F. Schory, timers; Orville Wright, chairman, contest committee N. A. A.; David S. Ingalls, Assistant Secretary of Navy for Aeronautics; and F. Trubee Davison, Assistant Secretary of War for Aeronautics, judges; Paul W. Litchfield, Dr. Karl Arnstein, Col. B. F. Castle, Harold E. Dungan, D. C. Young, L. K. Marshall, technical committee; and C. G. Andrus, aerological officer.

(*Continued on page* 122)



(P&A Photo)

"Southern Cross" over New York, completing second flight by heavier-than-air craft from Europe to United States

THE NEW ENDURANCE RECORD

WHEN the *Question Mark* established the world's refueling endurance record of 120 hours at Los Angeles, Calif., in January, 1929, it was generally believed, in view of the present design and construction of heavier-than-air craft and power plants, that this record represented approximately the maximum number of hours a plane could remain in continuous flight. Since that time, however, there have been several successful attempts to increase the time it is definitely known that an airplane can stay aloft by means of refueling from another plane. Undoubtedly, the increased duration of refueling flights has largely been made possible by the aeronautical data obtained from preceding attempts.

The opponents of refueling endurance flights point out that these continuous flights are usually undertaken as stunts and that the information which is derived does not warrant the expenditure of money, time and effort necessary. Whatever the motive in attempting them, it cannot be denied that such flights constitute a practical means of determining the performance of planes and engines under actual conditions of flight for an extended length of time. They determine, for example, what parts of the aircraft or power plant will first show signs of failure in the air, and thereby contribute to the improvement of such members to withstand wear and stress.

The *Question Mark* was forced to land when the rocker arms became worn because of the lack of lubricant. This difficulty has been eliminated in endurance flights that followed. The recent refueling flight on which the Hunter brothers established the new world's record ended when the oil screen became clogged. As a result, particular attention will be paid in the future to the elimination of similar difficulty.

Too often it seems that these refueling records are confused with non-refueling flights. The object of the latter is inherently different from those in which refueling in the air is done. Non-refueling flights indicate primarily the payload of a plane with relation to economy of fuel. Indirectly they indicate, as do refueling flights, the ability of the crew to withstand the conditions of the flight.

The longest period of time in which an airplane and crew have remained aloft with the aid of a refueling plane is 553 hours, forty-one minutes and thirty seconds, the new international refueling endurance record established in July by John and Kenneth Hunter at Sky Harbor, Chicago, Ill. They took off at 4:40 p.m., June 11, and landed at 6:21 p.m., July 4. Previous to their flight the longest time that a plane and crew had remained aloft was 420 hours, twenty-one minutes and thirty seconds, the former record made at St. Louis, Mo., in July, 1929, by Dale "Red" Jackson and Forest O'Brine in the *St. Louis Robin*.

For twenty-three days the endurance plane flew over Sky Harbor, ascending to a maximum altitude of 7,000 feet and coming down at times to fifteen or twenty feet above the ground. Little attention was paid to the plane during the first week. It was just another "attempted" flight to break the world's record of seventeen and one-half days in the air, using a "second-hand" plane in which John and Kenneth had previously failed to raise the mark. After the first week, the flight began to attract more wide-spread interest.



(*P&A Photo*)

Kenneth Hunter making emergency repairs on flight which established new world's endurance record of 553 hours, 41 minutes and 30 seconds

Albert and Walter Hunter went aloft regularly in *Big Ben*, the refueling plane. Their sister Irene prepared food for her brothers as they continued to fly above the airport. The J-6 Wright Whirlwind functioned perfectly. The brothers made emergency repairs. Kenneth climbed out on the catwalk or fuselage to repair the engine or to remove debris which had collected on the tail surfaces. When they had equaled the former record and then surpassed it, they announced that the flight would go on indefinitely, perhaps until July 7 or 8. In the late afternoon of July 4 the *City of Chicago* came down low over the field and landed unexpectedly.

"The motor was beginning to freeze," John Hunter explained. "The oil screen became clogged and we could not clean it."

After the first few days in the air John and Kenneth reported that they became accustomed to the conditions of the flight and, as far as physical condition was concerned, they could remain in the air indefinitely.

The endurance plane and the refueling ship are Stinson-Detroiters, model SM-IF, made by the Stinson company in August, 1928, and used by the Hunter brothers in a previous attempt to set a new endurance refueling mark. This flight ended October 11, 1929, John and Kenneth as pilots, after 264 hours in the air at Chicago. The endurance plane in this flight was known as the *We Will*. According to reports, the planes were used by an airline and completed 30,000 miles of flying before the first attempt.

The plane which set the new record was equipped with Scintilla magnetoes, Haskelite plywood, Thompson valves, Pioneer instruments and a Stromberg carburetor. Fuel and oil were supplied by the Deep Rock Oil Company.

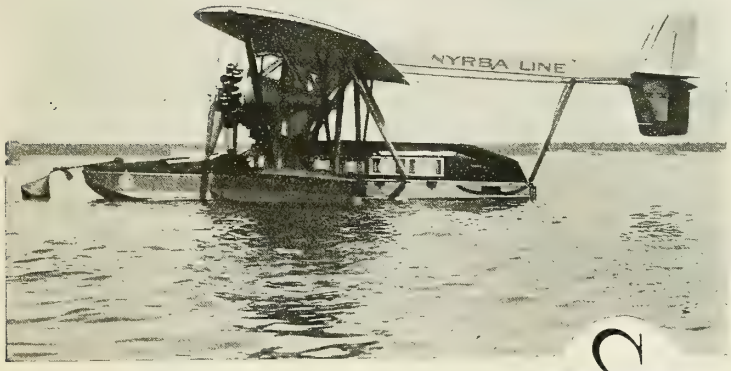
A refueling hose about thirty feet in length and with a diameter of one and one-half inches was used. From fifty to ninety gallons of gasoline were let down into the plane at each refueling contact. Each day, oil and grease requirements consisted of fifteen gallons of Deep Rock Aero Oil Grade No. 4 and occasional greasing with Deep Rock Rocker Arm Lubricant. The oil was delivered in five-gallon cans lowered by rope. The plane consumed 8,405 gallons of gasoline on the flight, according to the Deep Rock company, and flew a total of more than 40,000 miles. Contact with the refueling plane was made 223 times, two of them being effected in the dark. An average speed of about seventy miles per hour was maintained.

The *City of Chicago* has a wing span of forty-seven feet; high speed of 135 miles per hour; a cruising speed of 115 miles per hour; landing speed, fifty miles per hour; climb, 1,000 feet per minute; and a ceiling of 18,500 feet. The ship is powered with a stock Wright Whirlwind 300, a radial air-cooled engine, rated at 300 horsepower and capable of 2,000 revolutions per minute. An average of 1,400 revolutions per minute was maintained throughout the flight.

All of the Hunter brothers are transport pilots.

Flying the east coast of SOUTH AMERICA with "NYRBA"

A Fleet of Nine Sikorsky Amphibions contributes comfort, luxury and speed to the service of the world's longest air line



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Rio, from your window in the comfortable Sikorsky Amphibion cabin. A picturesque city, three feet above sea level, surrounded by conical mountains and curving bays



Some hundred and forty miles northeast of Rio de Janeiro lies the city of Campos. The leisurely Parahyba River provides a waterway for small steamers . . . and an excellent landing field for Sikorsky Amphibions

TO the New York, Rio and Buenos Aires Line goes the distinction of putting wings on the great Eastern trade route to Latin America's six billion dollar markets. Their 10,000 mile transport system extending from Miami, Florida, to Santiago, Chile, links together 16 nations and colonies of the Americas. Travel time between the United States and Chile is cut to 8 days . . . a saving of 12 days over travel by boat.

As an important part of its flying equipment "NYRBA" uses a fleet of 9 Sikorsky Amphibions. These fast, luxurious ships are used to provide complete point-to-point service over the route. With their capacity to land upon and take off from either land or water, these "S-38's" are particularly valuable along the East Coast. Powered with two 420 H. P. "Wasp" engines, the "S-38" can fly and maneuver on either engine. She has a cruising speed of 110 miles per hour, which contributes generously to time economy.

Equally valuable to business men at home are the qualities of the "S-38" which influenced the selection of this ship for use on the "NYRBA" lines. With many cities having waterways close to their business centers, the "S-38" allows its owner to take full advantage of the great economies of air travel. A recently issued folder covers more details of the "S-38." May we send you a copy? Sikorsky Aviation Corporation, Bridgeport, Connecticut. Division of United Aircraft & Transport Corporation.

Sikorsky S-38, Holder of Four World's Seaplane Records—

3 Altitudes with respective loads of 4409 pounds, 2204 pounds, and 1109 pounds.

1 Speed with 4409 pounds load at 143.7 m.p.h. —Carrying this weight faster than ever before On Water—On Land—In Air.

EXPORT MARKET STABLE

By LEIGHTON W. ROGERS
Chief, Aeronautics Trade Division

THE aeronautic export trade from the United States was so large during 1929, in comparison with previous years, that it was thought by many that during that peak year a virtual saturation point had been reached for aircraft and kindred products in certain of our best markets for these items. Instead, while domestic sales of aircraft for the current year are considerably under those for the first five months of last year, exports from January to May, inclusive, were but eleven per cent under those for the same period of 1929. From all indications, this trade will be maintained if not increased this year, since foreign markets heretofore uncultivated are being opened up by means of demonstration missions, thorough attention to overseas requirements, and the inspection system of the Aeronautics Branch of the Department of Commerce which is now available for all aircraft before export.

It may be the general impression from viewing the current favorable position in exports, as compared with last year, that lowered prices of American aircraft are responsible. That this is not completely true is indicated by the fact that the average unit value of aircraft exported during the first five months of 1930 was $15,200, as compared with a unit valuation of $16,650 for the corresponding period in 1929.

Total exports of aircraft, engines and parts exclusive of tires during the first five months of 1930 were valued at $3,591,357, as compared with $4,000,071 during the same period in 1929. May, 1930, was the record month for all time with aeronautic exports valued at $1,391,159. The peak month of 1929 was June, when exports of these items amounted to $1,174,721. During June of last year, forty-nine complete aircraft valued at $955,879, were exported as compared with fifty-eight valued at $867,918 during May of this year.

Canada, China, Peru, Japan and Argentina were the leading markets for aircraft, indicating a diversification in markets; this factor being partly responsible for the favorable position in this trade. Of the complete aircraft exported during the period from January to May, inclusive, of this year, fifty-one per cent went to Latin American countries. Some of the exports of complete aircraft were for operation on the international airlines in South and Central America owned by United States capital. European countries did not figure at all as purchasers of complete aircraft from the United States, although engines and parts shipments to Europe remained important.

Six markets which made no purchases of United States aircraft engines during the first five months of 1929 made purchases during the same period of this year. These included Java and Madura, China, Bolivia, Colombia and Australia. Germany remained the principal market in point of value, purchasing fifteen engines valued at approximately $100,000. Peru absorbed twenty-one engines at a slightly lower total valuation. Although figures for the first five months of 1929 and 1930 do not show engine exports to Europe, other than Germany, recent reports indicate that American engines are to be used on European-made planes on several of the European airlines.

Shipments of aircraft parts and accessories from the United States during the period under review not only increased $93,449 over the $846,510 worth exported during the same period of last year, but went to countries such as Surinam, Java and Madura, Yugoslavia and the Union of South Africa, which were not included as countries of destination during the earlier period. Canada remained the best market for new and replacement parts. Soviet Russia in Europe supplanted China as second in importance, although China held a prominent place in exports with shipments of parts valued at over $40,000 during the first five months of the current year. Thirteen European countries were included in this trade in parts and accessories as compared with nine European countries during the same period in 1929, indicating perhaps that our fittings and aeronautic supplies are required because they are unavailable from local sources.

EXPORT SALES FOR FIRST 5 MONTHS

	Jan-May 1930 Units	Jan-May 1930 Value	Jan-May 1929 Units	Jan-May 1929 Value
AIRPLANES ...	132	$2,042,223	146	$2,435,106
ENGINES	128	609,175	149	718,455
PARTS	...	959,952	...	846,510

In connection with the recently available statistics of United States exports of aeronautic products it is of importance to consider those of European countries. France, the principal exporter of aircraft, shipped during the first quarter of the current year $1,353,520 worth of complete aircraft. Brazil, Rumania and Switzerland were among the major markets. This valuation is in comparison with fifty-six aircraft valued at $883,702 exported from the United States during the first quarter of 1930. The United Kingdom during the first four months of 1930 exported approximately $2,150,000 worth of aeronautic equipment, including engines and parts. Shipments of these items from the United States during the same period total $2,200,198. During the first four months of 1930, Germany exported twenty-four complete heavier-than-air-craft valued at $206,160, as compared with seventy-four from the United States at $1,175,000. Countries of destination are not available for the British and German exports during the early months of 1930, nor are units for France and the United Kingdom.

APPROVED FLYING AND GROUND SCHOOLS

FORTY-FOUR schools throughout the United States had been approved by the Department of Commerce on June 1 to give ground and flying instruction leading to pilots' and mechanics' licenses, according to a recent report of officials of the department. The schools received Approved School Certificates following examinations of equipment, personnel and general organization by Federal inspectors.

The practice of examining and approving schools has been adopted by the Department of Commerce for the purpose of identifying those schools which provide facilities deemed adequate according to the standards established by the Department.

In the following list of flying and ground schools approved by the Department of Commerce, the ratings which the schools have received are indicated by the symbols—T, transport; Lc, limited commercial; and P, private.

Airtech Training School, Airtech Field, San Diego, Calif.; T, Lc, P.

Altoona Aircraft Corp., Stultz Field, Tyrone, Pa.; Lc., P.

Art Goebel Aviation Co., Inc., 101 West 12th St., Kansas City, Mo. (Ground); Liberty Field, Liberty, Mo. (Flying); T, Lc, P.

Boeing School of Aeronautics, Oakland Municipal Airport, Oakland, Calif.; T, Lc, P.

Calif. Aerial Transport Flying School, Municipal Airport, Los Angeles, Calif.; in combination with Western College of Aeronautics, Municipal Airport, Los Angeles, Calif.; T, Lc, P.

Curtiss Flying Service, Valley Stream Airport, Valley Stream, L. I., N. Y.; in combination with New York University, New York, N. Y.; T, Lc, P.

Curtiss Flying Service of the Middle West Fairfax Airport, Kansas City, Kan.; T, Lc, P.

Curtiss-Wright Flying Service, 1258 Russ Bldg., San Francisco, Calif. (Ground); Oakland Airport, Oakland, Calif. (Flying); T, Lc, P.

Curtiss-Wright Flying Service, 1338 S. Michigan Ave., Chicago, Ill. (Ground); Curtiss-Reynolds Airport, Glenview, Ill. (Flying); T, Lc, P.

Curtiss Flying Service, Los Angeles Municipal Airport, Inglewood, Calif.; T, Lc, P.

Curtiss Flying Service of Ind., Stout Field, Mars Hill, Indianapolis, Ind.; Lc, P.

Curtiss Flying Service of South, Memphis Municipal Airport, Memphis, Tenn.; Lc, P.

Curtiss Flying Service of Ky., Bowman Field, Louisville, Ky.; Lc, P.

Curtiss Flying Service, 1013 Madison Ave., Toledo, Ohio (Ground); Transcontinental Airport, Walbridge, Ohio (Flying); T, Lc, P.

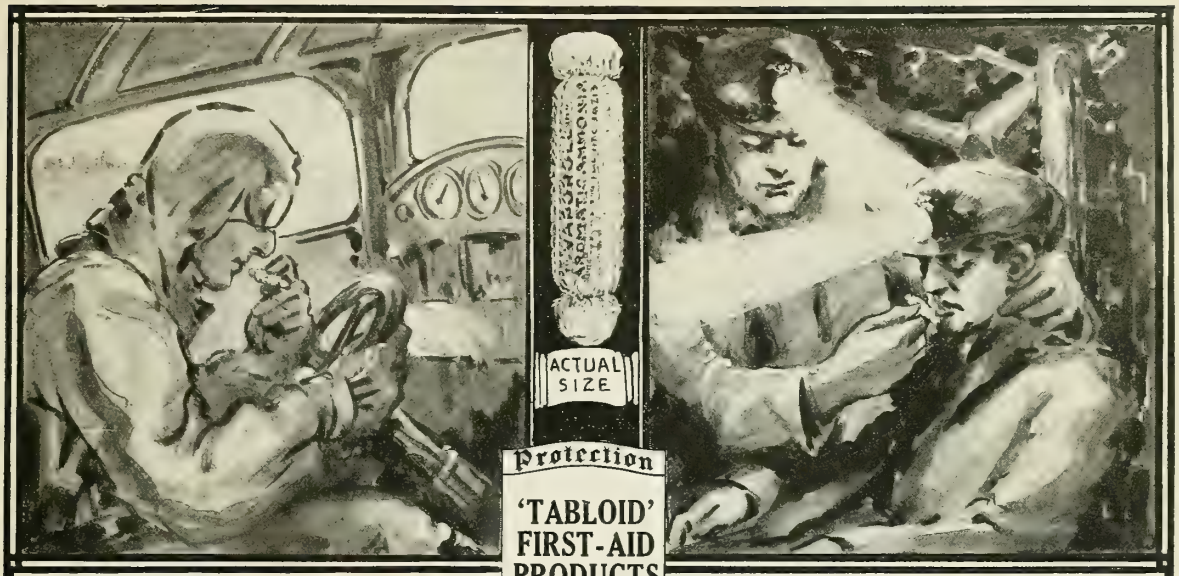
Curtiss-Wright Flying Service, 55 Allyn St. (Ground); and Brainard Field, Hartford, Conn. (Flying); T. Lc. P.

Curtiss-Wright Flying Service, 115 High St., Portland, Me. (Ground); Portland Airport, Scarboro, Me. (Flying); T, Lc, P.

Curtiss-Wright Flying Service, Miami Municipal Airport, Miami, Fla.; T, Lc, P.

Curtiss-Wright Flying Service, 46th and Colorado Blvd., Denver, Colo.; Lc, P.

(Continued on next page)



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(*Continued from preceding page*)

Curtiss-Wright Flying Service, 1360 Main St. (Ground); and Buffalo Municipal Airport, Buffalo, N. Y. (Flying); T, Lc, P.

Curtiss-Wright Flying Service, Port Columbus, Columbus, Ohio; T, Lc, P.

Curtiss-Wright Flying Service, N. C. State College (Ground); and Raleigh Airport, Raleigh, N. C. (Flying); Lc, P.

Curtiss-Wright Flying Service, 1811 Main St. (Ground); and Owens Field, Columbia, S. C. (Flying); Lc, P.

Curtiss-Wright Flying Service, Curtiss-Wright Airport, Dalworth, Texas; Lc, P.

D. W. Flying Service, Inc., Le Roy Airport, Le Roy, N. Y.; Lc, P.

Embry-Riddle Flying School, Lunken Airport, Cincinnati, Ohio; T, Lc, P.

Garland School of Aeronautics, 51st and Sheridan Rd., Tulsa, Okla.; T, Lc, P.

Hancock Foundation College of Aeronautics, Santa Maria Airport, Santa Maria, Calif.; T, P.

Lincoln Airplane and Flying School, 2415 "O" St. (Ground); and Municipal Airport, Lincoln, Neb. (Flying); T, Lc, P.

Mamer Air Transport School of Flying, 320 Paulsen Bldg. (Ground); and Felts Field, Spokane, Wash. (Flying); T, Lc, P.

Parks Air College, Inc., Parks Airport, E. St. Louis, Ill.; T, Lc, P.

Penn School of Aviation, Pittsburgh-Butler Airport, Butler, Pa.; T, Lc, P.

Pitcairn Aviation of Pa., Inc., Pitcairn Field, Willow Grove, Pa.; Lc, P.

Roosevelt Aviation School, Inc., 119 West 57th St., New York City (Ground); Roosevelt Field No. 1, Mineola, L. I., N. Y. (Flying); T, Lc, P.

Spartan School of Aeronautics, Apache Blvd. and Chamberlain Dr., Tulsa, Okla.; T, Lc, P.

Standard Flying School, 9401 S. Western Ave., Los Angeles, Calif.; T, Lc, P.

T. C. Ryan Flying Service, Ryan Airport, 3300 Barnet Ave., San Diego, Calif., in combination with Pacific Technical University, 2119 Kettner Blvd., San Diego, Calif.; T, Lc, P.

Universal Flying School, Wold-Chamberlain Field, Minneapolis, Minn.; T, Lc, P.

Universal Flying School, Lambert Field, St. Louis, Mo.; T, Lc, P.

Universal Flying School, Fairfax Airport, Kansas City, Kans.; T, Lc, P.

Universal Aviation School, 344 North Exchange St., St. Paul, Minn., in combination with Universal Flying School, Wold-Chamberlain Field, Minneapolis, Minn.; Lc, P.

Universal Aviation School, Memphis Municipal Airport, Memphis, Tenn.; T, Lc, P.

Universal Flying School, Cleveland Airport, Cleveland, Ohio; T, Lc, P.

Von Hoffman Aircraft School, Lambert Field, Anglum, Mo.; T, Lc, P.

Yellow Cab School of Aviation, Municipal Airport, Des Moines, Iowa; T, Lc, P.

FRANK H. RUSSELL has been elected vice president of the Curtiss-Wright Corporation. Mr. Russell recently resigned as vice president of the Curtiss Aeroplane and Motor Company, a position which he had held for the past eleven years.

A NATIONAL campaign to popularize private flying with the American public was to be launched in July by the National Aeronautic Association. Included in the program is an airplane tour by P. W. Halverson, secretary of the private flying club committee, for the purpose of promoting national organization of flying clubs affiliated with the National Aeronautic Association.

North American Aviation Acquires Control of Berliner-Joyce Corporation

[E. W. WALSH]

REORGANIZATION of the Berliner-Joyce Aircraft Corporation, of Baltimore, Md., under the control of the North American Aviation Corporation, was completed recently. The new company will be known as the B-J Aircraft Corporation. Thomas A. Morgan, president of the Sperry Gyroscope Company, one of the subsidiaries of the North American Aviation Corporation, will be president.

Thomas B. Doe, president of the Eastern Air Transport, another North American subsidiary which operates the air mail from New York through Baltimore and other cities to Atlanta, is a vice president of the B-J Aircraft Corporation. Temple H. Joyce, formerly vice president in charge of sales of the Berliner-Joyce Corporation, is vice president and general manager of the new corporation. Henry A. Berliner, former vice president in charge of production of the Berliner-Joyce Aircraft Corporation, has been made a director of the new company. John W. Sanderson, treasurer of North American, is secretary-treasurer, with W. H. Bowne as assistant.

Meeting of International Air Commission at Geneva

THE International Air Navigation Commission of the League of Nations assembled for the first time at Geneva, July 8, to begin the formulation of a program promoting closer international coöperation in civil aviation. The delegates began the study of aeronautical information supplied by the aviation experts of various countries, including Col. Charles A. Lindbergh and Dr. Hugo Eckener.

Aviation statistics of the commission show that in transport flying last year a distance equivalent to 1,560 times the distance around the earth was flown over. Planes in the United States flew a total of 20,640,000 miles. German planes flew 5,875,000 miles, as did those of France. British planes cov-

(*Continued on following page*)

RECENT APPROVED TYPE CERTIFICATES

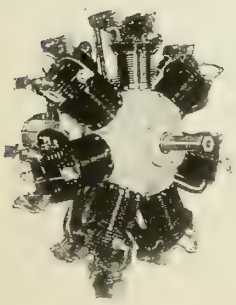
Airplanes listed below have received Approved Type Certificates subsequent to those listed in the February issue of AERO DIGEST, and are supplementary thereto:

Key: p—place; o—open; c—closed; l—landplane; am—amphibion; s—seaplane; conv—convertible; fb—flying boat; b—biplane; m—monoplane.

ATC No.		Weight Empty	Useful Load	Gross Weight
277	Cardinal C2-110, 2pclm (Kinner 90)	1,006	557	1,563
278	Travel Air 10-D, 4pclm (Wright 225)	2,130	1,270	3,400
279	Lincoln PT, 2polb (Kinner 90)	1,176	591	1,767
280	Travel Air 4P, 3polb (Ace 140)	1,531	1,857	2,388
281	Fokker F-32, 32pclm (4P&W at 525)	14,910	8,590	23,500
282	American Phaeton R-540, 3polb (Wright 165)	1,759	801	2,560
283	American Phaeton J-5, 3polb (Wright 220)	1,896	907	2,803
284	Lincoln PT, 2polb (Warner 110)	1,203	591	1,794
285	Courier PB-1, 3pclm (Kinner 90)	1,387	713	2,100
286	Spartan C-3-225, 3polb (Wright 225)	1,741	959	2,700
287	Savoia Marchetti, 3poam-b (Kinner 90)	1,451	699	2,150
288	Detroit Sea Rover E-2, 4poib-b (Challenger 185)	1,745	980	2,725
289	Fairchild 71-A, 7pclm (P&W 450)	3,156	2,344	5,500
290	Spartan C-3-166, 3polb (Comet 130)	1,637	968	2,605
291	Consolidated, 17 Fleetster, 8pclm (P&W 575)	3,326	1,974	5,300
292	Stearman 4-E, 3polb (Wasp 450)	2,426	1,510	3,936
293	American Eagle 201, 3 polb (Kinner 90)	1,168	782	1,950
294	Stinson SM-8B, 4pclm (Wright 225)	2,063	1,137	3,200
295	Stinson SM-8A Junior, 4pclsm (Lycoming R-680, 215 h.p.) Landplane	2,061	1,134	3,195
	With Edo P Floats	2,440	1,080	3,520
296	Ford 5AT-C-S, 15pcsm (3 P&W 450), with Aircraft Products floats A-27,000	8,675	4,825	13,500
297	Mohawk M-1-C, 2polm (Warner 110)	1,124	658	1,782
298	Stinson SM-7A (Wright R975 300)	2,234	1,266	3,500
299	Bach 3-CT-9S, 9pclm (2 Wright 760 at 225, 1 Wasp 450)	5,193	2,807	8,090
300	Lockheed Model 8 and 8-A Sirius, 2polm (Wasp 450). Model 8 Model 8A	2,974 3,056	1,626 1,544	4,600 4,600
301	American Eagle D-430, 4pclm (Wright 165)	1,864	1,133	2,997
302	American Eagle E-430, 4pclm (Continental 165)	1,875	1,133	3,008
303	Driggs Skylark Model 3, 2polb (Rover 75)	878	501	1,379
304	Stearman 4C, 3polb (Wright 300)	2,256	1,544	3,800
305	Stearman 4D, 3polb (P&W 300)	2,297	1,503	3,800
306	Mono Monocoupe 90, 2pclm (Lambert 90)	859	591	1,450
307	Ford 9A, 13pclm (3 P&W at 300)	6,863	3,267	10,130
308	Detroit Vega DL-1, 7pclm (P&W 450)	2,563	1,707	4,270
309	Curtiss Robin 4C-1A, 4pclm (Challenger 185)	1,811	1,039	2,850
310	Spartan C-4-255, 4pclm (Wright 240)	2,325	1,190	3,515
311	Waco NRF, 3 polb (Warner 110)	1,150	747	1,897
312	Stinson SM-8D, 4pclm (Packard Diesel 225 h.p.)	2,175	1,025	3,200
313	Waco NKF, 3polb (Kinner 90)	1,125	747	1,872
314	Rearwin 2000-CO, 3polb (Continental 165)	1,447	912	2,359
315	Inland Super-Sport S300-U, 2polm (Warner 110)	916	574	1,490
316	Verville 104-P, 4pclm (Packard Diesel Dr-980, 225 h.p.)	2,300	1,100	3,400
317	Davis D-1-66, 2polm (LeBlond 66, 85 h.p.)	854	526	1,380
318	Alexander Bullet C-7, 4pclm (R-540, 165 h.p.)	1,708	1,082	2,790
319	Bellanca Skyrocket CH-400, 6pclm (Wasp 450)	2,590	2,008	4,600
320	Consolidated Fleetster Model 20, 1polm (Hornet B575)	3,333	2,567	5,900
321	Star E Cavalier, 2pclm (Lambert 90)	919	506	1,425
322	Stearman 4EM, 1polb (Wasp 450)	2,455	1,455	3,936
323	Verville AT, 2polb (Continental 165)	1,562	678	2,240
324	New Standard D-29-S, 2polb (Kinner 100)	1,195	655	1,850
325	Stearman 4CM, 1polb (Wright R-975, 300 h.p.)	2,285	1,651	3,936
326	Stearman 4DM, 1polb (Wasp Jr. 300)	2,326	1,610	3,936
327	Monocoupe, 2pclm (Warner 110)	1,020	600	1,620
328	Bellanca Pacemaker 300W, 6pcslm (Wasp Jr., 300 h.p.) Landplane	2,465	1,835	4,300
	Seaplane	2,922	1,835	4,757
329	Stinson SM-7B, 4pclm (Wasp Jr. 300)	2,312	1,188	3,500
330	Boeing Monomail, 1polm (Hornet B 575)	4,626	3,374	8,000
331	Kari-Keen 90, 2pclm (Lambert 90)	1,014	534	1,548
332	Ogden Osprey, 6pclm (3 American Cirrus, at 90)	2,898	1,650	4,548
333	Waco HSO, 3polb (Packard Diesel Dr-980, 225 h.p.)	1,814	786	2,600
334	Aeromarine Klemm AKL-26-B, 2polm (LeBlond 66, 85 h.p.)	1,016	565	1,581



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WARNER "Scarab" ENGINES

(*Continued from preceding page*)

ered 1,375,000 miles.

The countries reported represented on the commission are as follows: Germany, France, Belgium, Great Britain, Italy, Spain, Japan, Holland, Sweden, Poland, Jugo-Slavia, Switzerland, and Brazil.

AERO DIGEST GLIDER PILOT LOG BOOKS

AS an expression of its interest in glider flying and to be of help to clubs and individuals participating in gliding activities, glider pilot log books have been prepared by AERO DIGEST and will be distributed free of charge to those applying in person or by mail to the offices of this magazine, 220 West 42nd Street, New York City. The book contains provision for the entry of complete data on twenty-three glider flights, and is so arranged that the total time for previous flights may be entered at the end of each flight. Adequate space is provided on each page for the entry of all necessary information. In addition, the AERO DIGEST glider pilot log book contains a page where information concerning the owner of the book may be entered, and a reprint of the Air Commerce Regulations affecting gliders and glider pilots.

Guggenheim Grant for Rocket Experiments Announced

A GRANT for the continuation of experiments by Professor Robert H. Goddard of Clark University, Worcester, Mass., in rocket propulsion to reach extreme altitudes has been made by Daniel Guggenheim. Professor Goddard began his present series of experiments in 1912-13 while at Princeton University. The work was originally carried forward with assistance from the Smithsonian Institution and Clark University and later the Carnegie Institution of Washington.

The rocket is propelled by the thrust produced by expelled gases created either by igniting powder or causing the combustion of two liquids.

RICHARD C. GAZLEY and Stanley S. LaSha, consulting aeronautical engineers of Washington, D. C., have been appointed chief and assistant chief, respectively, of the Engineering Section of the Aeronautics Branch, according to a recent announcement of Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Mr. Gazley succeeds Kenneth M. Lane. Mr. LaSha replaces Earl C. Friel.

Flying School Student Time Limit Waived by Department of Commerce

CIVILIAN schools approved by the Aeronautics Branch, Department of Commerce to give flying instruction, will be permitted to accept students for instruction without being required to graduate them within any time limit, according to a recent announcement of Gilbert G. Budwig, Director of Air Regulation.

These schools will be allowed to accept students on an hourly or part-time basis and they need not necessarily be graduated. These new procedures were effected by the waiving of certain parts of the Department's School Regulations.

COMING AERONAUTICAL EVENTS

July 20-August 7. International Light Plane Tour, starting from Berlin-Tempelhof Airport, Berlin, Germany.
August 1-2. Dedication of McGhee Tyson Field, Knoxville, Tenn.
August 2-3. Air Meet, Danville, Ill.
August 8-17. Great Lakes Air Cruise, auspices Detroit Flying Club.
August 9-10. Colorado Springs Air Meet and Tour, auspices Colorado Springs Chamber of Commerce, Colorado Springs, Colo.
August 9-24. International Gliding Meet, auspices Rhoen-Rossiten Gesellschaft, East Prussia, Germany.
August 18-20. National Legislative Air Conference, sponsored by the Air Law Institute, Evanston, Ill.
August 23-September 1. National Air Races, Chicago, Ill.
August 26-28. S. A. E. Aeronautic Meeting, Chicago, Ill.
August 31-September 1. James Gordon Bennett Balloon Race and Aerial Carnival, Cleveland, Ohio.
September 1. First Annual Thompson Trophy Race, Chicago, Ill.
September 1-4. Sioux Falls Airfair, Soo Skyways Airport, Sioux Falls, S. D. Sanctioned by N. A. A.
September 1-6. Fifth International Air Congress, The Hague, Holland.
September 6-8. International Aero Exhibition, Stockholm, Sweden.
September 11-27. National Air Tour, starting and ending at Detroit, Mich.
September 13-14. Dedication of Williamson-Johnson Airport, Duluth, Minn.
October 17-20. Dedication of Municipal Airport, Denver, Colo.
November 27-December 14. Aeronautical Salon, Paris, France.
December 10-23. International Congress of Aerial Security, Paris, France.

National Legislative Air Conference

THE National Legislative Air Conference will be held at Chicago, Ill., August 18-20, sponsored jointly by the Aerial Navigation Commission of the State of Illinois; Chicago Association of Commerce; Midwest Air Parley of N. A. A.; and the Air Law Institute of Northwestern University. Governor Emmerson of Illinois has invited the Governors of the other States to attend and over thirty have indicated they will be present personally in addition appointing delegates to represent their states officially.

The program of events includes addresses by the following: A. D. McNair of England; M. Albert Laper of France; Prof. Ambrosini of Italy; Dr. Pablo Justiz of the World Court; Governor Emmerson, Gurney Newlin, Wm. P. MacCracken, Jr., Col. Clarence M. Young, George B. Logan, Major G. L. Lloyd and Major Reed G. Landis.



(Right) C. W. Chapman of U. S. Lines bids bon voyage to Al Williams and Mrs. Williams

(*Continued from page* 115)

American entrants will include in addition to Ward T. Van Orman, a Goodyear balloon and one of the Detroit *Times*, these last two having won first and second place respectively in the elimination race which started at Houston, Texas, July 4. The story of the bag representing AERO DIGEST by Samuel T. Moore, pilot, appears in the feature section of this issue.

HARRIS M. HANSHUE has resigned as president of the General Aviation Corporation and the Fokker Company, due to the responsibilities which he has assumed in connection with Western Air Express and other air lines, according to a recent announcement of James A. Talbot, chairma of the board of the General corporation. Mr. Hanshue will continue as director of the General Aviation Corporation. William T. Whalen, vice president and general manager of the Fokker Company, has resigned his position with Fokker and returns to the General Motors Corporation.

James M. Schoomaker, Jr., has been elected president of the General Aviation Corporation and general manager of the Fokker Company.

LED by Lieut. Lee Gehlbeck, of Little Rock, Ark., ten planes participating in the All American Derby, sponsored by American Cirrus Engines, Inc., landed at the municipal airport, Houston, Texas, about noon of July 24. He won first prize money of $500 as the Houston-lap prize. As we go to press, the planes have taken off for San Angelino, Texas, the next stop on the course of the race scheduled to end at Detroit, August 1.

Stub Quinby was second to arrive at this point. The other pilots in the race arrived at Houston as follows: L. Bayles, S. T. Stanton, Charlie Meyers, Joe Meehan, Bill Cahill, H. Ogden, Larry Brown and Cecil Coffrin.

CANADIAN AIRWAYS LIMITED

ROOM 601
THE KEEFER BUILDING
1440 ST CATHERINE STREET WEST
MONTREAL, CANADA

TELEPHONE UPTOWN 3690 PLEASE ADDRESS REPLY TO THE FIRM AT ...

Moncton, N. B.
April 29th, 1930.

Berry Brothers, Inc.,
Detroit, Michigan.

Dear Sir:

This machine shown in the enclosed photograph was purchased two years ago and since then its original finish of Berryloid has never been touched except for an occasional washing. It has been used for every conceivable work including mail, photography, exploration, transportation, joy hopping, racing, etc.

All last winter it was used in the Chibougamou mining districts of Northern Quebec where hangars are unkown, and this winter was on the Saint John-Moncton mail route. Except for the last two months and a few weeks in Montreal last summer it has never known the luxury of a hangar. When I took the machine to Montreal a short time ago for overhaul the finish was still in very good condition.

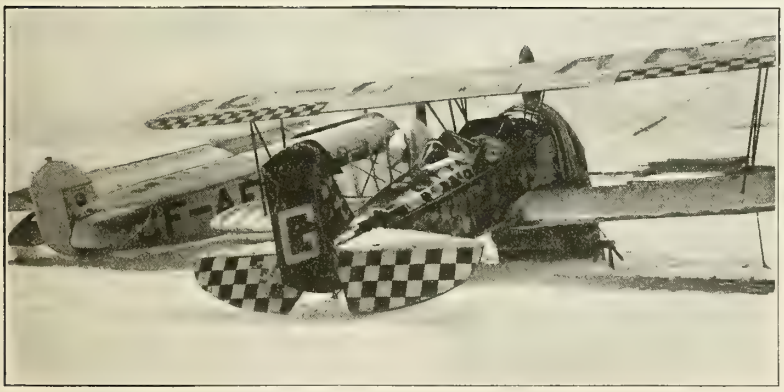
At the time the photograph was taken the machine was covered with nearly an inch of ice and a great deal of this had been removed before it occurred to us to photograph it.

Yours truly,

W. H. Irvine
Supt. Air Mail Service

BERRYLOID BAFFLES

ARCTIC COLD *and* BURNING SUN



OVERWHELMINGLY first choice of airplane builders and operators everywhere—Berryloid Aircraft Finishes have won their leadership in action. The above letter describes a typical experience—indicates the reason why the aviation industry relies on Berry Brothers for protective products. Our Aviation Division—manned by experts—will be glad to help you solve any problems concerning the finishing or covering of aircraft. Write for information and new combination color card and finishing specifications.

BERRY BROTHERS INC.
Varnishes Enamels Lacquers
Detroit, Michigan *Walkerville, Ont.*

Manufacturer of Progressive Aircraft Finishes

Member Aeronautical Chamber of Commerce

NEW YORK

THE Waco 225 has been flight tested for pontoons and has been given Approved Type Certificate 311, the same certificate allowed for the land gear, following tests conducted at College Point, L. I. Department of Commerce approval covers the Waco 225 powered with the J-6 Wright Whirlwind, the Waco 220 with the J-5 Wright Whirlwind and with both straight and tripod landing gear.

THE first of the powered glider or light airplane of the "Dragonfly" design will be ready for flight tests within the near future, according to a recent announcement of Alfred Schwartz, president of the Wing Aeronautical Corporation of New York City. Mr. Schwartz developed the thirty-five horsepower engine to be used in the Dragonfly. The ship is designed for sport use and short point-to-point flights. The ship is designed to glide in favorable wind currents, but have the features of a light airplane, taking off under its own power. The cruising speed is seventy miles per hour. Capt. Frederick Pippig of Germany is chief engineer in charge of construction.

LEE SHOENHAIR recently completed a flight of 250 miles from Rochester, N. Y., to the Newark Airport in one hour and twenty-five minutes. His average speed was 204 miles per hour. He used a Lockheed Vega monoplane powered with a Wasp engine.

PERFORMANCE tests of the twenty-passenger Burnelli all-wing monoplane are being conducted by Roger Q. Williams at Roosevelt Field, L. I. Mr. Williams is testing the Burnelli transport, known as the UB-20, on an average of an hour a day. In line with the experiments being conducted, he frequently flies the UB-20 for a considerable time without touching the controls.

VICTOR VERNON has assumed the management of Colonial air lines, according to a recent announcement of F. G. Coburn, president of The Aviation Corporation of Delaware, of which Colonial is a subsidiary. Mr. Vernon, as division manager, will assume the duties of Major General John F. O'Ryan who will become vice president and a member of the executive committee of American Airways, Inc., transport subsidiary of The Aviation Corporation.

A STUDY of parachutes for the Civil Government Air Operation of Canada has been started at the Irving Air Chute plant, Buffalo. The work is being conducted by Flight Leftenant Albert Carter, Sergeant W. F. McCauley, and Air Craftsman G. Brown, all of the Royal Canadian Air Force.

MR. CORNELIUS MITCHELL, of New York City, recently purchased from George A. Wies, Inc., of Roosevelt Field, L. I., a Stearman airplane powered with a Packard Diesel engine.

ANNOUNCEMENT has been made by Ernest Jones and Edward E. Green of the establishment of an engineering and general service bureau in New York City. Experimental engineering work, engine and aircraft design and stress calculations will be conducted by the engineering branch of the company. The work of the organization will also include compilations and statistics, reports, investigations and patent research.

CENTRAL NEW YORK

[M. MARVIN]

THE operation of a Syracuse-Elmira passenger airline was recently started by Eastern Aeronautical Corporation of Newark, N. J., Syracuse and Elmira, N. Y. Two planes are flown each way over the line daily. The morning plane leaves Elmira at 8:30 a. m. and arrives in Syracuse at 9:20 a. m., leaving Syracuse for Elmira at 9:30 a. m. The afternoon plane leaves Syracuse at 4 p. m., arriving at Elmira at 4:50 p. m.; leaves Elmira for Syracuse on the return trip at 5 p.m., reaching Syracuse at 5:50 p.m.

Two pilots will be employed on the line. They are Gardner "Peg" Nagle, who will fly the morning plane both ways; and Al C. Brooks, who will fly the round trip in the afternoon plane. A Stinson biplane will be used for the morning run and a Ryan monoplane will be used for the afternoon trip.

Express will also be carried on the Syracuse-Elmira line.

LIEUT. TREMAINE HUGHES of the New York State Police, Troop D, is giving flying instruction to six fellow troopers. He flies to three different fields in addition to the Oneida Airport, to give lessons. Corporal B. D. Cooper of the Phoenix patrol takes his instruction from Lieutenant Hughes at Hayes Airport, Cicero. Trooper M. W. Stevenson of Elbridge takes his instruction at the Municipal Airport, Amboy. Corporal C. E. Doran of the Waterloo sub-station is taught at Geneva. Troopers J. E. Wheeler and J. L. Fitzpatrick take their instruction late each afternoon at the Oneida Airport. Lieutenant Hughes averages about twenty-one hours a week flying time. He uses a Great Lakes trainer owned jointly by his students and himself.

NEW ENGLAND

THE Pioneer Flying Club with headquarters at King Field, East Taunton, Mass., was recently organized with ten members. The club has purchased a Command-Aire 303 and many of the club members are working up time quite rapidly. Two are ready for private pilot's examination. The club is limited to ten members. The membership fee is $200 and the members pay $7.00 per hour for solo time. The officers of the club are: Joseph P. Murphy, president; Harold Glynn, secretary; and Clifton A. McCrillis, treasurer.

INGALS Aircraft Corporation, Walpole, Mass., has been appointed Savoia-Marchetti dealer for Eastern Massachusetts and Rhode Island, by the American Aeronautical Sales Corporation. E. Fletcher Ingals is president of the Ingals company.

THE Lexington Flying Club of Lexington, Mass., recently organized in Lexington, has elected the following officers: Frank J. McPeake, Jr., president; Francis Cotter, vice president; Robert Hannam, treasurer; and George Needham, secretary. The club has a membership of fifteen. Present plans include the acquisition of a flying field near Lexington and the purchase of a Great Lakes or a Moth.

JOHN AND WALTER O'TOOLE have acquired the Old Colony Airways and Muller Field, Revere, Mass., from Al Radish, according to a recent report. They will operate under the name of the Beacon Air Service, servicing airplanes, conducting a ground school and passenger flights. The headquarters of the company were formerly located at Beachmont.

The Beacon Air Service maintains facilities for servicing airplanes throughout

(Continued on next page)



Twenty passenger Burnelli monoplane UB-20 being tested at Roosevelt Field, L. I., by Roger Q. Williams



Military Standards do make better pilots

FOR those who are considering a course of training in any branch of aviation and who cannot afford to make a mistake in the selection of a school, we urge investigation of the Spartan School of Aeronautics, an institution high in business character, but particularly an institution with a training system and a training standard unusually productive of results. ¶The Spartan School of Aeronautics has never relied for patronage on the name of a well advertised pilot. Spartan, on the contrary, built an institution from the bottom. Training planes are far above the average rating for flying equipment. Training schedules were carefully laid out in line with Government requirements. Instructors are steady, mature, widely experienced. And as a result Spartan was one of the first schools to receive approval of the U. S. Department of Commerce as transport ground and flying school. ¶From the beginning Spartan has emphasized the value of semi-military discipline in its relation with students and the necessity of military exactness in training. For it is generally agreed that military standards do produce better pilots. ¶Our 32-page, illustrated book gives a thorough description and an accurate mind picture of the Spartan School of Aeronautics. It also explains the Spartan extended tuition payment plans and our free transportation offer to new students. It will be sent free on receipt of the coupon, properly filled in.

SPARTAN SCHOOL of AERONAUTICS

SPARTAN SCHOOL OF AERONAUTICS,
Tulsa, Oklahoma.

Gentlemen: Please send me your 32-page book describing all Spartan School courses, extended tuition payment plans and information about free transportation to Tulsa.

NAME_____

ADDRESS_____

CITY_____ STATE

(New England News continued)

the New England district. In connection with the opening of Muller Field this summer, the O'Toole brothers will operate a ground school two nights a week at their shop which will be continued at Beachmont. The company operates three Wacos and a Travel Air.

[T. F. BRESNAHAN]

A NEW airport has been opened at Misquamicut Beach in Westerly, Rhode Island, giving that section of the State three fields. The other two are located near Charlestown, R. I. The new field, according to present plans, will be operated only during the summer months.

THE Rhode Island Flying Service, Inc., has taken over the What Cheer Airport at Pawtucket, recently vacated by the Curtiss-Wright firm. The opening program was held July 6 when more than a dozen planes participated in an air meet.

Keith Mathews, Mrs. Teddy Kenyon and Loraine Defren, all members of the Boston Wing and Prop Club, assisted in the program.

The Pawtucket company has formed a glider club with fifteen members. Chief Pilot Kurt Langborg will act as instructor for the club.

Officers of the company are as follows: J. Crane, Jr., president; Cliff Burgess, vice president; Wayne Langley, treasurer; and Arthur Ormsby, field manager. Mr. Langborg is chief pilot; Charles Flaherty, chief mechanic, and Jack Cleary, radio technician.

THE Providence *Journal* has started the organization of a glider club.

THE plant leased by the Eastern Aircraft Company at Pawtucket, R. I., several months ago has been sold at public auction.

INSPECTOR Hoyt of the Department of Commerce has announced that in the future on all his visits to Rhode Island and nearby Massachusetts territory he will establish headquarters at the What Cheer Airport in Pawtucket. All examinations will be given there.

NEW JERSEY

A SUCCESSFUL demonstration of a fire-prevention device for airplanes was conducted recently by Alfred Schwartz, president of the Wing Aeronautical Company, at the company's laboratory, Jersey City, N. J. Before a group of airport managers and insurance representatives, Mr. Schwartz showed how his invention utilized motor heat to generate a gas which drives oxygen away from the motor. The gas used is carbon tetrachloride.

THE Suneagles Aviation Country Club was recently organized at Eatontown, N. J., according to an announcement of Fred L. Foster, president. Mr. Foster is the head of the Department of Aviation, Richfield Oil Corporation, of New York.

The former Suneagles Country Club will be conducted as an aviation country club under a completely reorganized program. The new board of governors of the organization includes Col. Clarence M. Young, Capt. Frank M. Hawks, Harrison F. Tucker, Tom Hardin and Sherman B. Altick.

The club property consists of 1,000 acres. A 120-acre sodded landing field is provided and hangar facilities are being prepared.

THE American Gas Accumulator Company, which for a number of years has been associated with airway and airport lighting in the United States and abroad, has organized into one department all of its aeronautical activities.

In addition to distributing its own products, the new division will be the exclusive distributor for the B. B. T. Corporation of America, and for the airway and airport lighting equipment made by the Sperry Gyroscope Company, Inc.

PENNSYLVANIA

THE Aeronautical department of the State of Pennsylvania has received two Stinson Junior planes powered with Lycoming engines for use by inspectors of the aeronautical commission. The commission's inspectors regularly visit the various airports in the State for the purpose of enforcing traffic rules and inspecting the fields and equipment.

Division of Penn School of Aviation at New Harrisburg Airport

COINCIDENT with the practical completion of construction on the Harrisburg Airport, Penn School of Aviation announced the opening of a Harrisburg division, where ground and flying instruction will be given. The Harrisburg field, situated about four miles from the center of the town, is financed by private subscriptions of Harrisburg citizens. One hangar has been completed at the field and a hard surfaced runway has been built. It is expected that other runways of 3,000 feet by 125 feet in all directions will be completed shortly. Pittsburgh Aviation Industries Corporation, operators of the 640-acre Pittsburgh-Butler Airport, will operate the Harrisburg Airport. The field will be formally opened in August.

The Penn School of Aviation has started instruction at the field, using two Fleets, a Fairchild and a KR-34 for flying instruction. Training is supervised by Lieut. Fred Nelson.

The curriculum used at the Harrisburg division will be the same as that used by the Penn School of Aviation at its headquarters, Pittsburgh-Butler Airport. The system is based on the methods of the Air Corps. Ground school courses and mechanics courses are included in the curriculum, and will be given either in conjunction with or separate from flying courses.

At present only limited commercial and private pilots' courses will be given at Harrisburg, students taking the transport courses being transferred to the main section of the school at the Pittsburgh-Butler Airport. The school plans to give transport courses at Harrisburg when the installation of lighting facilities has been completed.

PHILADELPHIA

[R. GARD]

MICKEY COCHRANE of the Philadelphia Athletics has taken up gliding. He is taking gliding instruction at the Penllyn Polo Club under the direction of Jack Bartow of the Wings Corporation.

AGENCY for the Aeronca, produced by the American Aeronautical Corporation, has been acquired by the Ludington-Philadelphia Flying Service.

THE entire field organization of the Ludington Philadelphia Flying Service has been transferred from the Philadelphia Airport to Central Airport, Camden. New offices now being equipped will be located in the southeastern corner of the hangar. The accounting department was installed in one end of the section and headquarters of the officials in the other.

The change follows the shifting of the service station for Wright and Kinner motors from the Philadelphia Airport. Only a small crew of mechanics and the oil force will be kept at the municipal field. Cav Newlin will take over the duties of Bob Hewitt, general manager of the company, at the Philadelphia Airport.

PITTSBURGH

[BOB COATES]

FORTY thousand persons gathered at Curtiss-Bettis field here at the closing of the two-day circus staged by the Curtiss Exhibition service, marking the formal opening of the Curtiss-Bettis port.

Curtiss pilots and officials were entertained by officials of the Gulf Refining Company at a dinner in the Pittsburgh Athletic Association rooms the evening preceding opening of the circus. Pilots were also guests of local service clubs and the Aero Club of Pittsburgh at the Fort Pitt Hotel.

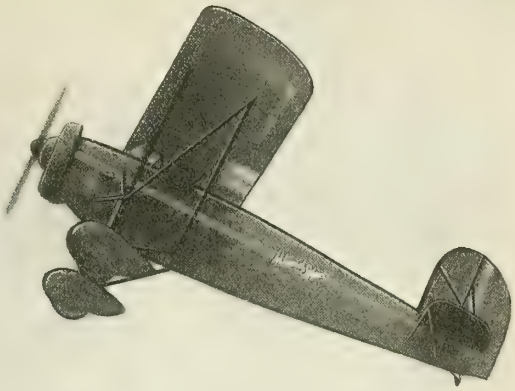
CAPT. FRANK McCAFFREY of the 324th Observation Squadron is division air officer during the summer encampment of the 99th Division at Camp Meade. Thirty-two members of the 324th were given medical examinations at Rodgers Field recently by Major M. G. Healy, flight surgeon of Dayton.

ALMOST $2,000,000 of the special bond issue has been expended in the construction of the new city-county airport and it is reported that the Department of Public Works will be unable to complete the project with available funds. An extra appropriation of $220,000 will be required for the grading now under way and for the acquisition of additional property.

The county commissioners recently ordered condemnation proceedings on 100 additional acres of land, fronting on the Lebanon Church Road. Total acreage of the port will be 700 acres.

Director of Public Works Brown said the

(Continued on next page)



WHY IS THE INLAND SPORT FAST?

It is not just a happy accident, nor a combination of lucky circumstances which makes INLAND SPORT airplanes so *fast*. They are built that way for a definite purpose.

Inland Aviation Company believes that the airplane is a necessity in the fast-moving world of today. Business and social life have been speeded up until nothing but transportation by air can satisfy that urge for fast travel which began centuries ago with the ox cart.

Inland Aviation Company believes that the airplane is transportation and should be used for nothing else. Trick flying and all of the rest of the circus stunts should be left to test pilots on experimental fields. That's their business. Outside loops are not air transportation.

The airplane brings to the business world one major advantage, that of *fast transportation*. It has no competitor in this respect.

That is why Inland Aviation Company builds fast airplanes. That is why the Inland Sport has won international recognition for its speed. That is why the Inland Supersport has never been defeated by an airplane in its power class with an Approved Type Certificate.

All three models of Inland Sport Monoplanes will be flown in their respective classes at the National Air Races in Chicago, August 23 to September 1. When not racing, these sturdy little ships will be on the line for your inspection. Demonstration flights will be arranged for prospective purchasers upon request. We cordially invite you to visit us during the races.

Manufactured at Fairfax Field, Kansas City, Kansas, under approved Type Certificates No. 295 and 315, by the Inland Aviation Company



INLAND SPORT MONOPLANE

"TOMORROW'S PLANE TODAY"

(Pennsylvania News continued)

port would not be in condition even for emergency landings before August 1 and that there were no funds for hangars and additional equipment.

A GLIDER contest was held recently at the Pittsburgh-Greensburg airport under the auspices of the Women's Flying Association of Pittsburgh.

CHARLES W. CARNEAL, formerly with the Potomac Flying Service, is now with Pennsylvania Air Lines, Inc., as reserve pilot.

MARYLAND

ALL of the capital stock of G. W. Brogan, Inc., Advertising Agency, Towson, Maryland, has been purchased by VanSant, Dugdale & Corner, Inc., of Baltimore, Md., according to a recent announcement of Wilbur VanSant, president of the company. The combined companies will continue as a general advertising agency.

THE appointment of W. A. Coon as district sales manager with headquarters in Chicago, Ill., was recently announced by officials of the American Hammered Piston Ring Company of Baltimore, Md. The territory over which Mr. Coon will have charge includes Illinois, Indiana, Wisconsin, and the Western part of Michigan.

[E. W. WALSH]

THE Berliner-Joyce Aircraft Corporation of Baltimore, Md., is completing an experimental two-place pursuit plane, known as the XP-16. In the Berliner-Joyce plane, which is no longer than present single-seaters, the gunner will sit in a small compartment with his back to the pilot and his head almost flush with the edge of the cockpit. From this position he is able to fight off a plane attacking from the rear.

The span of the wing is thirty-three feet; overall-length, twenty-seven feet; and height, ten feet. It is powered by a twelve-cylinder, V-type engine equipped with a supercharger developing 600 horsepower.

A NEW manufacturing program involving a change in policy has been announced by the Glenn L. Martin Company, aircraft manufacturers of Baltimore. Under the new plan, the company will abandon its policy of manufacturing airplane parts and accessories for other airplane parts solely for its own use. According to the announcement the company will undertake to manufacture airplane parts and accessories for other airplane manufacturers as well as for its own use.

At the present time, it was declared, the company is engaged in manufacturing 189 gasoline tanks of 108-gallon capacity each for another manufacturer. The manufacture of this order constituted the first variation from the previous policy of manufacturing for the company's own use. All parts built for other companies, it was said, will be constructed to Government specifications and will be subject to the vibration and pressure tests called for by the United States Navy.

WASHINGTON, D.C.

[C. A. WEIR]

New York-Washington, D. C., Airway Corporation to Start Line

WASHINGTON is to be the headquarters of the New York-Washington Airway Corporation. The company is capitalized at $1,000,000, and will not offer stock to the public. It is owned by C. T. and Nicholas Ludington of Philadelphia.

The line, scheduled to start passenger service August 15, will operate between Washington and New York, and will send out a plane from each end of the line hourly between 8 a.m., and 5 p.m. Washington Airport will be the local terminal and the airline's home base. The line will use trimotor Stinson monoplanes.

Planes will be equipped with two-way radio, and the line will have its own weather and teletype communication between fields, in addition to the weather service provided by the Government.

There will be a field office at Washington Airport, and a general office in the Washington building.

Fares will approximate rail plus Pullman fares. The flying time between Washington and New York will be one hour and forty-five minutes, with a total time of two hours and thirty-five minutes between the business centers of the two cities.

Newark Airport will be the northern terminal. Bus service from the Pennsylvania Station to the airport will be provided. The stop at Philadelphia will be at the Camden Central Airport. There will be ten trips each way daily, covering 4,000 flying miles.

Nicholas Ludington is president of the new company and C. T. Ludington, chairman of the board. Administration of the line will be in the hands of three vice presidents—Amelia Earhart, Paul Collins and Gene Vidal.

Miss Earhart will be in charge of the New York office, with development of passenger and express traffic as her special province.

Collins, for nine years a mail pilot with National Air Transport and later general superintendent of T. A. T., will be operations manager. Vidal, a West Point graduate and a former pilot of the Army Air Corps, will have charge of traffic. Collins and Vidal will work in Washington.

VIRGINIA

[C. N. SNEAD]

THE Brotherhood of Fliers has been formed at Richmond, Va. Among the members are John A. Hicks, agricultural statistician for the Federal and State governments; James M. Hayes, Jr., formerly State motor vehicle director, at present affiliated with the State Corporation Commission; Henry G. Shirley, State highway commissioner; Col. Willard D. Newbill, of the adjutant general's office; Colonel Peter Saunders, secretary to the Governor, and E. R. Combs, State comptroller. Several women are included in the membership of the organization.

A GLIDER club of ten members has been organized at Roanoke under the direction of Frany Reynolds. A Waco glider of the primary type has been purchased by members of the club.

GEORGE MASON, book salesman of Roanoke, Va., recently purchased a Waco. He will use the plane in connection with his sales work for the Classroom Teacher, Inc., of Chicago.

KENTUCKY

[A. W. WILLIAMS]

CHARTERS were granted recently to two flying services in Kentucky: the Fountain Run Flying Service, Fountain Run, Ky., $2,000, J. W. Hagan, J. B. Dossey and I. F. Pedigo; and the Bluegrass Flying Service of Lexington, Ky., capital $5,000, Harkness Edwards, J. Owen Reynolds, and Monroe Bradley.

THE Louisville & Jefferson County Air Board, Louisville, which manages Bowman Field, has announced that it will construct eight small, individual type hangars at the field. They will be of a portable knock-down type, and will be located at the east side of the field. These hangars will be leased by the month. If this type of hangar proves satisfactory, it is planned to add others as they are required.

TENNESSEE

[R. F. ASH]

THE State Aeronautics Commission has adopted the regulations of the Department of Commerce making illegal the flying of an airplane by an unlicensed pilot. The regulations were adopted on the recommendation of Marshall C. Hoppin of the Department of Commerce who attended the meeting.

"The act creating the commission gave us authority to set up such regulations and provide penalties for the violation," C. H. Baker, State Highway Commissioner, said.

Eighteen airports in Tennessee are completed or under construction, Mr. Baker said. In addition there are more than three score emergency landing fields.

The members of the State Aeronautics Commission are J. W. Canada and L. W. Hughes of Memphis; John Outlaw, Clarksville; Herbert Toomey, Johnson City; and C. H. Baker, Nashville.

Mr. Hoppin, in line with his work with the Department of Commerce, remained in Tennessee during the first part of July for the purpose of conferring with citizens of various towns and cities planning airports.

NASHVILLE failed to support the $1,000,000 airport building bond issue. Nashville will use Lebanon, Tenn.'s, Airport

(Continued on next page)



One flight tells you why—

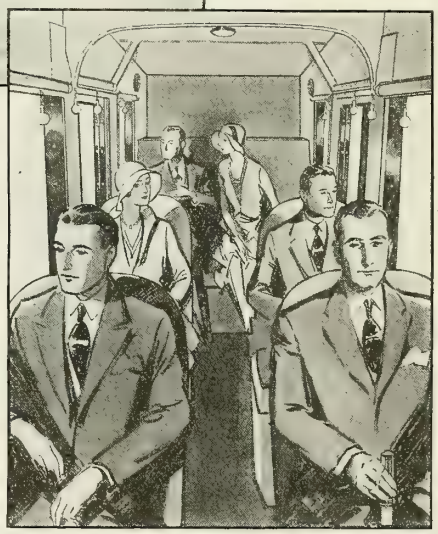
BUILT AS ONLY BELLANCA CAN BUILD

A DEMONSTRATION flight in the Bellanca *Pacemaker* is something more than just another "airplane ride." To even the airwise, it's a revelation of plane-building skill and performance.

In the comfortable, roomy cabin you will observe a quality of coachwork that has contributed notably to the Bellanca reputation — "America's Finest Airplane." The pilot will explain that you are enclosed within an ingeniously-designed body, a frame of protecting steel which provides an unapproachable degree of safety.

As you take the air, you will notice the snappy ease of the take-off, the quick climb, the fluent swiftness of the plane as your speed mounts to 145 miles an hour. Bellanca stability will have a new and impressive meaning to you. Perhaps you will want to take the dual controls — then you'll appreciate their fingerlight responsiveness and the importance of Bellanca flying qualities, that smooth "grip" on the air at all speeds.

It's an experience worth having, for it gives you a higher conception of airplane quality. And a demonstration flight can be arranged promptly to your convenience.



The *Pacemaker* cabin, looking aft. Comfortable, roomy, with no obstructions. Seats completely and deeply upholstered over steel frames. Unusually large windows. Full visibility from pilots' seats.

The Bellanca Pacemaker is a six-place cabin monoplane with 300 h.p. engine, Wright or Pratt & Whitney. Finished in finest automobile coachwork. High speed, 145 m.p.h. Payload with pilot, 1,235 lbs. U. S. Dept. of Commerce Approved Type Certificates No. 129 and No. 328.

The Bellanca Skyrocket, of similar specification, is powered with the 420 h.p. Wasp engine. High speed, 150 m.p.h. U. S. Dept. of Commerce Approved Type Certificate No. 319. Both types are readily convertible into excellent seaplanes.

The Bellanca Airbus is a 12 to 14 place single-engined monoplane, particulars of which will be sent on request to any commercial operator.

BELLANCA AIRCRAFT CORPORATION
NEW CASTLE, DELAWARE
Canadian Distributors: Bellanca Aircraft of Canada, Ltd., Montreal

BELLANCA

(Tennessee News continued)
for the time being.

THE ground school and all offices of the Memphis base of Curtiss-Wright Flying Service were moved recently from the South Second Street location to the company's building at Municipal Airport. The step was the first action of W. Howard Stovall, manager, following announcement of a decentralization program of the company, which materially increases the authority of the base executives.

Mr. Stovall said that photographic work was his base's leading revenue source, and crop-dusting next. Plane sales have improved this year, twelve having been disposed of since January 1.

[J. S. LINDSEY]

CHATTANOOGA'S new municipal airport, Lovell Field, was opened to the public July 1. A public inspection and reception was held on the evening of July 3. It was estimated that over 20,000 persons attended the affair which was held at night to introduce night flying to the public.

The new airport was named in honor of John Lovell because of his efforts to develop aviation in Chattanooga. He aided in the planning and designing of the field. Curtis Holmes is operations manager of the field. Lovell Field is located six miles east of Chattanooga and Missionary Ridge on the direct route from Sky Harbor, Murfreesboro, Tenn., to Candler Field, Atlanta, Ga. This route is now completely equipped with beacons and emergency fields.

The new field is equipped with boundary lights, floodlights, obstruction lights and a lighted wind cone. The hangar is of regulation size and of fireproof construction, having steam heat and a ventilating system. A large shop adjoins the hangar as does the heating and the electrical plant. Concrete aprons have been built. The administration building is located close to the hangar. It contains waiting-rooms and platforms, rest rooms, operations office, air mail office, and information bureau on the ground floor; pilots' lounge, outside balcony and meteorological department on the second floor; and a large observation tower and observatory on the third.

SOUTH CAROLINA

[B. WORKMAN]

IMPROVEMENT of the Greenville Municipal Airport has been started. The field, which is more than ninety acres in extent, has been graded, leveled, scraped and equipped with a drainage system. The lighting equipment installed includes a 4,000,000-candlepower Sperry floodlight, twenty-seven boundary lights, a Sperry rotating beacon, sixteen red obstruction lights, a ceiling light and a ceiling height indicator.

All this equipment was bought from the Curtiss-Wright Corporation and is being installed by Huntington and Guerry, a local electrical firm. In addition to these lights, the Department of Commerce will place a blinker light near the airport and will install two revolving beacons along the new mail route.

THE Greenville Glider Club recently purchased an Eaglerock Training Glider. Practically every one of the seventeen members of the club have made one or more successful flights. Dexter Martin of the local airport is instructor of the club.

LOUISIANA

[C. F. COCK]

PLANS for the Municipal Airport, Shreveport, were recently ordered revised and new bids taken when the City Commission opened the bids recently and found they exceeded available funds. The airport will be constructed at a cost of $300,000. Approximately $125,000 remained for equipping the field after the location was obtained. Lowest bids at the first opening were about $140,000. The airport will have a three-story administration building, hangars, beacon and other lighting equipment, and improved landing facilities.

EXPANSION of the U. S. Weather Bureau in Shreveport has been started. An appropriation of $12,000 a year will be available, and the personnel of the Bureau will be increased. New equipment will be added. An addition to the post office which is contemplated in the near future will make possible larger quarters for the Bureau. J. W. Cronk is meteorologist in charge.

BIDS were received July 21 for administration building and hangar for the East Baton Rouge airport, according to an announcement of the architects, Jones, Roessle, Olschner and Wiener.

THE Weddell-Williams Air Service, operators of a passenger line from New Orleans to Fort Worth, Texas, established an express service recently. Local and through service is provided.

THE most recent reports concerning the Army Air Corps base at Bossier Parish near Shreveport are that funds available for technical construction will be $1,012,500; and for quarters, hospital, warehouses and other construction, $2,641,000. The base will be used by the Third Attack Wing stationed at Galveston, Texas. Steps have been taken to have construction started soon.

ALABAMA

[O. G. JONES]

DELTA AIR SERVICE, operating a passenger line between Birmingham, Monroe, La., and Dallas, Tex., has inaugurated daily service to Atlanta. The Delta company will make one trip each way daily.

ORGANIZATION of a glider division of the Birmingham Aero Club was effected at a recent meeting at the Thomas Jefferson Hotel. A glider will be purchased by the club to be used for sport and instruction.

TEXAS

[C. MORRIS]

THE sport of gliding is gaining a foothold in the smaller as well as the larger towns of Texas. Since the formation of the San Angelo Glider Club two months ago, a Bowlus primary glider has been purchased for use of the membership and a sailplane is to be ordered if interest continues to increase at the present rate. The club is composed of twenty-four members. Brownsville Glider Club has purchased an Eaglerock glider and obtained land for operation. The Wichita Falls Glider Club has purchased an Eaglerock training glider. Kerrville Glider Club has been formed with Ralph Brockway as president and intends to purchase a glider. The Corpus Christi Glider Club has been organized by Paul King of the Texas Airplane Corporation.

A NEW airport, officially named Easterwood Field in honor of Col. W. E. Easterwood, Jr., for his activities in aviation industry, is under construction at Mineral Wells, Texas. One hundred acres of land have been purchased at a cost of $11,475. The project is being financed by a holding company and by the sale of stock to citizens.

PLANS for a new administration building at Sweetwater Municipal Airport, Sweetwater, Texas, have been drawn and the contract is to be let immediately. The structure will be stucco of Spanish architecture and will house ticket office, waiting rooms, field managers' and pilots' quarters, and an observation tower for control of field activities.

DEDICATION of the $75,000 Good and Foster hangar at Love Field, Dallas, attracted 15,000 people to the field. More than 100 planes participated in aerial maneuvers, according to Joseph T. Allen, chairman in charge of the dedicatory ceremonies.

AIRPORT bonds amounting to $100,000 have been voted by the City of Beaumont and are now awaiting sale.

A RADIO range beacon, operating hourly on a 350-kilocycle frequency, is under construction at Fort Worth Municipal Airport. It will be known as KKJ and will keep contact with Shreveport and Jackson, La.; San Antonio, Abilene, Midland, Houston, and Brownsville, Texas; Tulsa, Okla.; Wichita, Kan.; Little Rock, Ark.; and Memphis, Tenn.

CONTRACT for dismantling, removal and re-erection of the $75,000 all-steel Army hangar 111 feet by 210 feet from its present location in Little Rock, Ark., to Hensley Field, Dallas, has been let. The work is due to be completed within the month. Removal will cost the city $5,000. Barracks for forty men and homes for custodian and sergeant in charge of machines will be erected. The structures will be of brick veneer and stucco. Following com-

(Continued on next page)

GEARS



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THE Ex-Cell-O precision gear department employs the most modern and most accurate of gear production equipment; the most skillful operators available; heat treating methods in which each gear is as carefully handled as if it were the only gear in production.

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(*Texas News continued*)

pletion of the barracks and the hangar, the entire Army equipment and personnel now accommodated at Love Field will be moved to Hensley Field.

MAGNOLIA Petroleum Company is constructing a $75,000 brick and steel hangar at Love Field, Dallas. The structure, which will have 20,000 square feet floor space, is expected to be completed and equipped in ninety days. Flood lights on top of the hangar will be erected. Texas Aero Service and Colleges, Inc., will occupy the building.

FRANCIS Flying Service, a new commercial aviation company, has begun operations at Houston's municipal airport. The company offers student instruction, cross-country hops and air taxi service. Dale Francis heads the organization.

M. R. FEWELL of Dennison has been appointed aviation secretary of the Dallas Chamber of Commerce. He will succeed Roland Laird who resigned to accept a position with the Houston Chamber of Commerce.

J. E. GRISSOM AIR TAXI, INC., has been organized at Abilene with a capital stock of $5,000. The company will operate at Abilene Air Terminal, buying and selling airplanes and engaging in taxi service Incorporators are J. E. Grissom, Pearl Bunkley Grissom, and Clyde Grissom.

AERONAUTICS will be offered as an extra-curricular subject during the school year 1930-31 at the Texas Military College. Instruction will be given in ground subjects and in flying. George Cassady, manager of the Gainsville Municipal Airport, has been appointed instructor. Plans for a landing field and for hangars have been made.

THE annual International Convention of Pilot Clubs was held in El Paso recently. Officers for the coming year were elected and Pensacola, Fla., was selected as the 1931 convention city. Mrs. Virginia B. Rongeley, Montgomery, Ala., was elected president; Mrs. Nell Gardner, El Paso, first vice president; Mrs. Doris Van Aller, Mobile, Ala., second vice president; Mrs. Tom Bailey, Meridan, Miss., third vice president; Miss Carrie B. Allen, Montgomery, Ala., secretary; and Miss Effie May Harmner, Montgomery, Ala., treasurer. Directors chosen are Mrs. Ethel Cooper, Atlanta, Ga., and Miss K. Lee Bogers, Pensacola, Fla.

OKLAHOMA

[B. H. WITT]

OKLAHOMA'S latest air club is the Southwest Air Club which has thirty members enrolled. Warren Daniel of the Norman Flying Service has been named president of the club. Ernest Fair is vice president and general manager, and Bill Wiss is secretary and treasurer. The club plans to build a hangar at the Oklahoma City municipal port and to buy several training ships for exclusive use of the membership.

CLARK Aircraft Company of Ponca City has been granted a charter for $50,000 to manufacture airplanes in this city. Richard D. Clark is president. Other incorporators are Charles D. Reed and George E. McFail.

C. C. JULIAN and F. C. Hall have taken over the distributorship in Oklahoma for the Lockheed Aircraft Corporation. Flying and business offices are to be in Oklahoma City.

ROY O. FRENCH, has opened Oklahoma City's fourth airport and has organized the French Flying Service. Three Ryan cabin monoplanes are being used. The company airport and business office are located on Lincoln Boulevard, north of Oklahoma City.

SAM COFFMAN, former vice president of the Coffman Aircraft Company of Oklahoma City, designer of the Coffman monoplane, and Robert H. Tarbutton, recently opened Oklahoma City's third airport at Twenty-Third Street and May Avenue, using three planes and specializing in one dollar rides.

THE Chamber of Commerce of Ada, Oklahoma, is preparing plans for the presentation of a bond issue to the citizens of Ada for the purpose of building and maintaining a municipal airport at this city.

KANSAS

THE sales organization of the Inland Aviation Company, Fairfax Airport, Kansas City, Kan., has been expanded. In addition to Captain W. G. Moore, sales manager, four men are on the road merchandising Inland Sports, Sportsters, and Super-Sports. They are: Earl J. Williams, Charles D. Dailey, William A. Ong, and William S. Green.

[E. W. PRYOR]

THE Aero Club of Coffeyville, affiliated with the National Aeronautic Association, was organized recently. Officers are as follows: D. R. Brown, president; Fred Kistler, vice president; W. A. Ball, treasurer; and Ralph Florea, secretary. F. C. Oehler was named director to serve on the board with the officers. The club will immediately undertake improvement of Coffeyville's airport, with the view of getting Safeway Airlines to resume landings at Coffeyville.

WATKINS AIRCRAFT COMPANY, holding Approved Type Certificates for the Skylark, a low-wing monoplane, has produced a two-place low-wing speed job, powered with an eighty-five-horsepower LeBlond engine. Tested recently by G. A. McDonald, the ship made a high speed of 115 miles per hour. W. C. Cumming designed the ship.

MRS. PERRY HUTTON has been elected president of the Wichita Women's Aeronautical Association and governor for Kansas of the National Woman's Aeronautical Association, succeeding Mrs. Wilbur Neely. Other officers are: Mrs. C. D. Russell, vice president; Mrs. Neely, corresponding secretary; Mrs. H. W. Patton, secretary; Mrs. W. E. Searight, social chairman; and Mrs. Harry Neely, ways and means chairman.

A COMPANY to manufacture air togs has been organized at Wichita. A two-story factory building has been purchased by C. A. Faust, who will have charge of setting up the equipment. The company is financed and will be headed by a Wichita business man. More than $15,000 worth of sewing and cutting machinery has been ordered, with one carload on hand awaiting completion of remodeling of the building The company will manufacture leather breeches, helmets, wind breaks, sheepskin jackets, coveralls, cloth flying suits, etc. The plant was to be in operation August 1. From thirty to fifty men will be employed, according to present plans.

MISSOURI

[M. SHEETZ]

VICTOR ORR and Jack Agnew of Chillicothe recently bought a model 101 OX-5 American Eagle. They have secured the services of W. L. Trimble of the T. A. T. field at Fort Worth and will use the plane for charter trips and passenger hopping.

DOWNTOWN headquarters of the Fairfax Airports Corporation, Kansas City, have been transferred to the new Fairfax building, Eleventh Street and Baltimore Avenue, with other interests of the Woods Brothers Corporation, of which it is a subsidiary.

COLORED tables covered with umbrellas, and brightly colored chairs have been placed near the taxiway at the Kansas City Airport for the convenience of those wishing refreshments while they watch operations at the port. A barber shop has been opened in the passenger station and a restaurant will be installed. There are thirty-two regularly scheduled arrivals and departures of transport planes at the municipal airport daily.

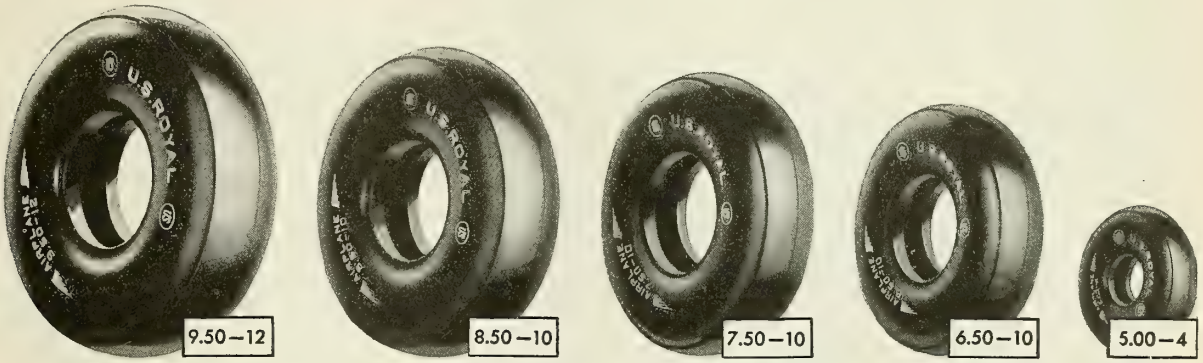
ST. LOUIS

[A. W. LEAGUE]

THE improvement of the west side of the St. Louis Municipal Airport is rapidly nearing completion. The new main entrance, including a flower garden, has been completed. The new service road, running the length of the hangars, is now in use and a parking area has been provided for the convenience of spectators. Extension of runways and other work on the landing field is planned. A new taxi strip, fifty feet wide, extending along the northern boundary

(*Continued on next page*)

INTRODUCING LOW PRESSURE



U.S.ROYAL AIRPLANE TIRES

United States Rubber Company now introduces a most advanced and practical improvement in tires for aircraft. These low pressure tires provide increased safety in flying operations through easier landing, and ground performance is much improved. Larger ground contact permits flying from soft and muddy fields with safety.

These tires are scientifically designed and built by long-established standard production methods. Basic manufacturing processes, using Web-Cord construction and flatband building, are incorporated—thus giving greatest strength of tire with minimum weight.

Aerodynamic drag, weight and cost of the new tire and wheel assemblies are comparable in every way with present high-pressure equipment. The sizes now available are 6.50-10, 7.50-10, 8.50-10, 9.50-12 for landing wheels and the 5.00-4 for tail wheels. A full line of all sizes will shortly be available.

UNITED STATES RUBBER COMPANY—WORLD'S LARGEST PRODUCER OF RUBBER

(*Missouri News continued*)

of the field, is nearly completed. Thirty thousand gallons of oil have been poured on the strip of landing area immediately in front of the concrete apron on the west side of the port. An additional 12,000 gallons of oil will be poured on the parking area back of the hangars on the west side of the field. The airport is soon to be fenced in by a high cyclone wire fence. A new concrete road from the airport to the city limits has been completed and is now in use. This new road places the airport just twelve minutes from the city limits.

CAPT. WILLIAM C. OCKER and Lieut. C. J. Crane flew from their base at San Antonio, Texas, to Scott Field recently, a distance of 900 miles, Captain Ocker piloting most of the way in a covered cockpit. Lieutenant Crane occupied an open cockpit, from which he landed the plane.

A RESTAURANT has been opened at Curtiss-Steinberg Airport. The dining room is enclosed with large windows, permitting a general view of flying activities. A playground has been installed for children visiting the field. All electric wires are in underground conduits.

ART HEMAN of the Curtiss-Wright Flying Service has completed the organization of the St. Louis Flying Club, composed of eleven members. The club has purchased a plane, and members will fly at the Curtiss-Steinberg Airport.

ILLINOIS

ERECTION in the Chicago Metropolitan District of a mast for the mooring of dirigibles is being urged by the Chicago Association of Commerce, according to a recent announcement of officials of the chamber. The association of commerce is understood to have no specific preferences regarding the location of a dirigible mast and field, as long as it is within reasonable proximity to the city.

TWENTY-FIVE Stinson planes have been sold by the Stinson-Chicago Company in the first three months of operation, according to a recent announcement of Bob Smalley, general manager. All of the planes were Stinson Juniors equipped with 210-horsepower Lycoming engines. Of the twenty-five planes delivered, twelve were bought by individuals or firms for business uses; eight were purchased for commercial transportation use; and five for sport flying.

TWO hangars and twenty-seven airplanes, twelve of them trimotor passenger planes, were reported destroyed by fire at the Municipal Airport June 25. The loss was estimated at more than $2,000,000. The hangars destroyed were reported to be those of the Universal Air Lines, Inc., and the Grey Goose Air Lines, the latter under lease to the Stout Air Line. The fire was reported to have followed an explosion of undetermined cause in one of the hangars.

C. D. McCORMICK, formerly assistant advertising manager of the C. F. Pease Company, Chicago, Illinois, manufacturers of Blue-Printing Machinery, Blue-Print Paper and Drafting Room Furniture, has been appointed advertising manager of the company to succeed W. Earle Pashley recently named second vice president and assistant sales manager of the company.

OHIO

THOMPSON Products, Inc., aeronautical division, has reported an order for 2,000 aircraft valves to be used in 100 Bristol Jupiter engines being built by the E. W. Bliss Company of Brooklyn, N. Y. The Bristol Jupiter Company, manufacturers of aircraft engines in England, will produce power plants in the United States through a contract effected with the Bliss company.

WILLIAM E. ARTHUR, president of the National Airport Engineering Company, Ltd., with executive headquarters at Los Angeles, Calif., has announced the appointment of G. H. "Jerry" McClelland as district manager of the organization, with headquarters at Cleveland, Ohio. Mr. McClelland was formerly branch sales manager of the Curtiss-Wright Flying Service at Cleveland. He served as pilot in the Naval Air Service during the World War.

COLUMBUS

[W. DONALD WALTER]

DURING the first six months of this year, traffic records of Port Columbus show that about 1,150 ships landed and took off. Transport passengers during this period numbered in excess of 6,000. Sightseeing passengers totaled about 1,850, more than 500 such passengers being carried in June. Student fliers made approximately 1,000 flights in the first six months. The TAT-Maddux line continues to be the heaviest passenger-carrier out of the port, but the Chicago-Columbus ships of Continental Airways, Inc., and the Columbus-Youngstown line of Ohio Air Transport continue to be well patronized; the latter two lines have been in operation about a month.

WITH all of Norton Field's ships at Selfridge for the summer camps, prospects for Reserve Corps flying at that station during the rest of the summer look very discouraging. Our two PT's were flown from Norton to Selfridge on July 1 by Lieuts. Waldo Rose and D. Forest Rumage. Lieutenant McConnell accompanying them in our O-11, overhaul of which was completed at Fairfield just in time to send it to camp. Our hangar at Norton Field is vacant; all we have left is Major Muehlenberg's O-11. Lieutenant McConnell flew to Fairfield the first week in July in an effort to obtain some kind of a plane for us to fly while our ships are at Selfridge, but there simply are no planes to be had. It looks as though those Reserve officers unable to get away to go to camp will not get in any time until fall, when our ships come back.

A CELEBRATION by officers of TAT-Maddux Lines and of the Pennsylvania Railroad, together with local city officials, marked the first anniversary of the opening of Port Columbus and the inauguration of the air-rail service July 8. Members of the official party, in one of the TAT Fords, took off with the regular passenger ships and accompanied them over the city; turning back to Port Columbus for breakfast after escorting the transports to the western boundary of Columbus.

TOLEDO

[G. LANGSDALE]

OFFICIALS of the Transcontinental Airport of Toledo, Inc., which operate a flying field of 565 acres near LeMoyne, seven miles east of Toledo, have leased the Curtiss-Wright hangar for three years from the Curtiss-Wright Flying Service, Inc. The company announced that $50,000 will be spent immediately in the improvement of the airport. The transfer became effective July 1. Chet J. Fenton will continue as manager, assisted by Clifford Rosecrans and Melvin Loop.

Under the new arrangement, accommodations are provided for thirty-seven planes and the proposed improvements include the laying of a hard-surfaced runway in front of the two hangars and the installation of a larger waiting room and ticket office.

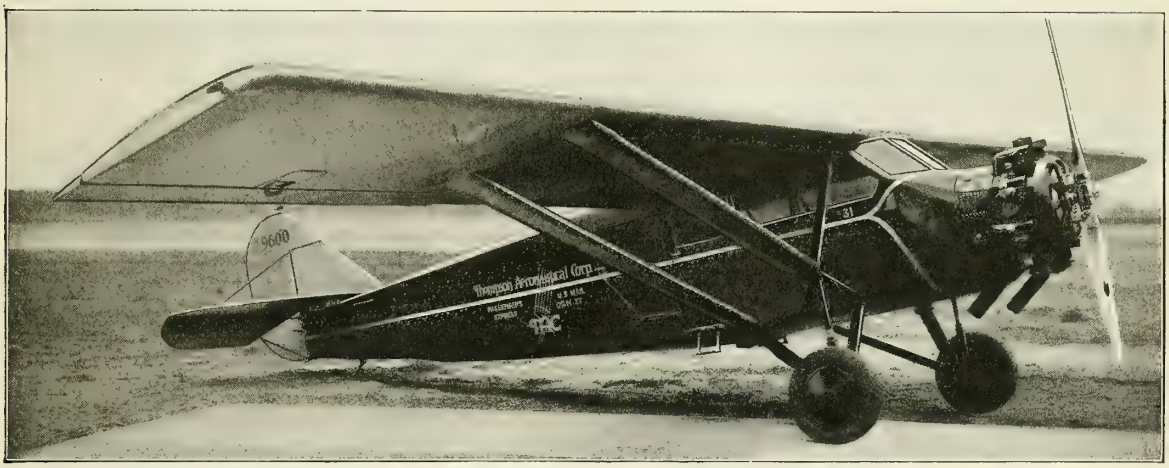
The companies now utilizing the port daily are National Air Transport, with six mail planes; Thompson Aeronautical Corporation, with two mail planes; Stout Air Lines, operating from Cleveland to Toledo, Detroit and Chicago, with two passenger planes; and Mason-Dixon Air Lines, operating from Detroit to Toledo, Cincinnati and Atlanta, four passenger planes.

The U. S. Weather Bureau recently increased its service at the airport to a twenty-four hour daily schedule, employing three men on eight-hour shifts. Equipment valued at $16,000 has been installed and the bureau is linked with the East and West Coasts by teletype, over which sixteen hourly reports are received.

TOLEDO'S aircraft show, held July 1-July 6 at the Transcontinental Airport, was attended by more than 15,000 persons. The exhibit included planes, motor boats and sportsmen's equipment.

THE Deibert Air Service, Inc., of Toledo, which has been incorporated to operate airplanes for hire, instruct students and give airplane exhibitions, plans to conduct a daily "bargain hour" for passengers. During this period passengers will be taken aloft for a charge of a penny a pound, the hour for this service being changed daily. Mrs. Peggy N. Deibert; her husband, L. G. Deibert; and Cletus H. Thornton, attorney, are the incorporators. The company operates a Curtiss Robin plane. George Agner is pilot. Flights will be made from the Transcontinental Airport.

And now—
the PACKARD-DIESEL
flies the mail



OVER the post roads of the air, the Packard-Diesel now flies the mail—swiftly, safely and with utmost dependability. For the Thompson Aeronautical Corporation—holder of government mail contracts—has equipped a Stinson plane with a Packard-Diesel and placed it in active service.

T. A. C. was quick to recognize the important advantages of the Packard-Diesel—lower fuel costs, greater fuel economy with resultant bigger pay loads, absolute fire safety and freedom from radio interference. These features meant more profitable, more successful operation.

Tests conducted after the Packard-Diesel installation was completed were highly satisfactory and the ship was granted an approved type certificate. Officials plan to use the Packard-Diesel-equipped plane on various T. A. C. routes in order to give all the pilots an opportunity to fly it.

The Packard-Diesel is steadily fulfilling its promise to aviation—"to give new impetus to flight." Today, more and more manufacturers and operators are equipping their planes with this revolutionary powerplant.

ASK THE MAN WHO OWNS ONE

PACKARD

MICHIGAN

STINSON Aircraft Corporation built and sold more planes in the first six months of 1930 than during the entire year of 1929, according to a recent announcement of W. A. Mara, vice president.

During this period the company built and sold 130 cabin planes as compared with 120 for the entire twelve months of 1929.

Of ninety-seven planes delivered in the first five months of 1930, ninety-one were Stinson Juniors equipped with 210-horsepower Lycoming engines, as were thirty-six of forty-three planes built and sold in June.

THE following were recently elected to the executive committee of the Aircraft Bureau of the Detroit Board of Commerce: G. Hall Roosevelt, president; William B. Mayo, William E. Metzger and Edward Macauley, vice presidents; Harvey Campbell, secretary; and Charles T. Bush, Norman B. Conger, Griffith Ogden Ellis, Arlo A. Emery, Harold H. Emmons, Sid A. Erwin, Edward S. Evans, Harry R. Graham, W. Magruder Jones, Eugene W. Lewis, Thomas S. Merrill, William B. Stout and Col. Sidney D. Waldon.

Great Lakes Air Cruise August 7-17

THE revised and definite itinerary of the Great Lakes Air Cruise sponsored by the Detroit Flying Club, was announced recently by Wayne J. Sheldon, cruise commander. A limited number of seats for passengers will be available in planes on the tour.

In its final form, the route of the cruise extends 2,600 miles over the shore lines of the five Great Lakes and Georgian Bay. Thirty towns and cities will be visited during ten days of flying, with one day of rest August 12, at Houghton and Hancock.

The planes will leave Detroit August 7 and return August 17. Manufacturers of planes equipped for landing on water have all been invited to take part in the cruise, and responses from Canadian and American manufacturers indicated that a minimum of twenty-five planes will start. The cruise will be made as a demonstration of the ease with which the Northern vacation lands can be connected by air with the commercial areas about the shores of the Great Lakes.

ELMER C. McKENZIE has been appointed assistant sales manager of the Ex-Cell-O Aircraft & Tool Corp., of Detroit, according to a recent announcement of N. A. Woodworth, president and general manager. John E. Well, formerly assistant sales manager, has been appointed advertising manager.

CONSOLIDATION of the plants of the Wolverine Screw Products Company and the Ex-Cell-O Aircraft & Tool Corporation recently merged at Detroit, has been practically completed. The Wolverine company formerly was a unit in the Air Parts & Tool Corporation, originally composed of the H. R. Krueger Company and the Wayne Tool Company. Air Parts was organized in August, 1929, to take over all assets of the two parent companies. Wolverine Screw was acquired last November through an exchange of stock, and on March 11, Ex-Cell-O acquired control. The Continental Tool Works was later added.

DOUGLAS W. CLEPHANE has been appointed publicity director for all the units of the Detroit Aircraft Corporation.

[K. F. ZEISLER]

Second Michigan Air Tour

THE Second Annual Michigan Air Tour started from Pontiac Municipal Airport, July 10, returning July 18. Between fifty and sixty planes entered. The caravan stopped at the following cities: Ypsilanti, Jackson, Battle Creek, Niles, Muskegon, Manistee, Petoskey-Harbor Springs, Newberry, St. Ignace, Cadillac, Saginaw, Bay City, Owosso, Lansing, Port Huron and Detroit.

At three cities, Niles, Manistee and Newberry, new municipal air ports were dedicated as a part of the tour ceremonies. The tour was sanctioned by the National Aeronautic Association, and was sponsored by the Pontiac Board of Commerce. Passengers were permitted to book passage on planes in the tour.

THE Michigan Aero Club has been awarded a charter by the National Aeronautic Association. The club is located at Detroit and owns a Fleet biplane.

THE Grand Rapids Flying Club has advanced the date of its air fair to August 8. Prizes totaling $2,000 will be awarded pilots competing in the events included on the program.

HOUGHTON and Keweenaw Counties in Northern Michigan are coöperating in the construction of an airport at Laurium. the field will be L-shaped. Runways will be 1,320 feet long and 200 feet wide.

HARBOR BEACH, on Lake Huron, has a new landing field with a 1,000-foot east and west runway and a 1,600-foot north and south runway.

WISCONSIN

[W. SCOLLARD]

MORE than 25,000 persons attended the dedicatory ceremonies of the new Curtiss-Wright Airport in the town of Granville, north of Milwaukee, July 6. Development of the airport began last August, a two story brick hangar being constructed. Pilots participating in the ceremonies included Dale (Red) Jackson, Leroy McGrady, Leo Allen, W. W. Osborne, George Wiens, Miss Frances Harrell, Lyman Voelpel and Jimmy Van Cise. Dan Kiser is manager of the local airport.

THE Pheasant Aircraft Corporation, Fond du Lac, has placed an order for 300 airplane engines with the Dayton Airplane Engine Company. The company will start manufacture of a low-priced monoplane as soon as an Approved Type Certificate has been issued by the Department of Commerce.

STANLEY PIASECKI, formerly acting head of the Milwaukee County airport, has been chosen permanent manager of the port by the county board's committee on highways. Fred Bell, acting assistant, was named permanent assistant manager of the port.

A NEW corporation to be known as the Westfahl Airways, Inc., has been organized at Oconomowoc to operate the airport in that city. H. C. Westfahl has been named president of the new corporation. Col. Philip C. Westfahl, Milwaukee, is a member of the company. Ted Schwantes, formerly of the Northern Airways, Inc., at Wausau, has been made general manager of the port.

The company, which plans to operate an aviation school, has been capitalized at $25,000. The erection of three new buildings, including a hangar, has been completed at the airport and plans are going forward for the construction of an additional hangar.

A FLYING school and air transport service has been started at the Delton, Wis., airport under the supervision of the Midwest Airways, Inc., of Milwaukee. The Midwest Airways will keep a fleet of planes at the Delton airport. The airport was dedicated June 28.

MINNESOTA

[L. F. YOUNGSTROM]

AS a major step in a program of aviation promotion, an airport plan practical for development in smaller communities throughout the State of Minnesota has been drafted under the auspices of the State American Legion organization.

With American Legion posts in every section of the State competing for the Brittin trophy, offered by Col. L. H. Brittin, vice president and general manager of Northwest Airways, Inc., to the post making the outstanding contribution of the year to the advancement of aviation, installation of air markings and airports throughout the State is being carried on under the direction of the Minnesota Department's Aeronautics committee.

Many communities have not established an airport because of the belief that it was necessary to acquire and develop a large tract of land at high cost, it has been found by the committee. As a result of the committee's findings, a plan was evolved which provides for an airport adequate for handling modern transport planes, and the installation of a hangar and boundary markers adapted to night flying at a cost within the reach of practically every community.

USE of pneumatic tubes to speed delivery of mail from the St. Paul Airport to the city post office, and between St. Paul and Minneapolis, is provided in a bill intro-

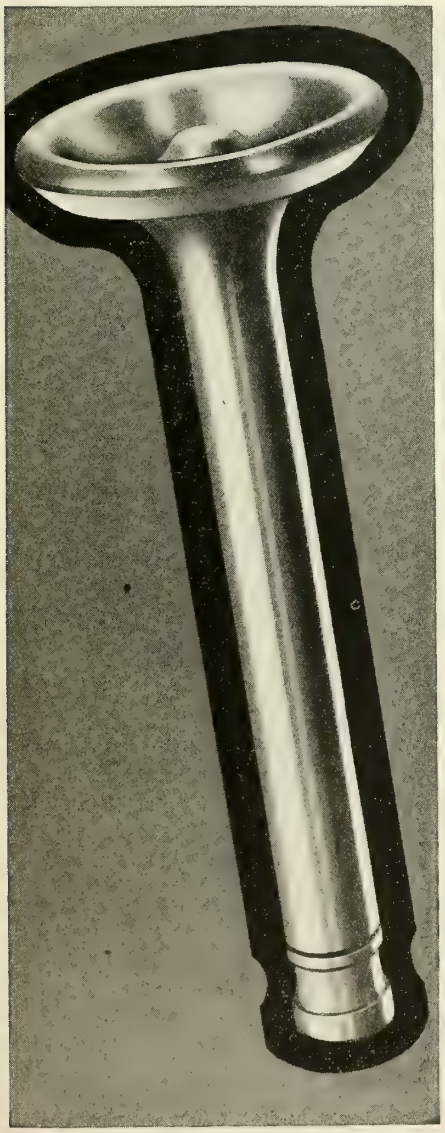
(Continued on next page)

FAMOUS FLIGHTS WITH THOMPSON VALVES

From NEW YORK to GERMANY

with the "COLUMBIA"

(This advertisement is one of a series recalling historic airplane flights in which Thompson Valves were used).



For the second time in one year, a brilliant trans-Atlantic flight was successfully completed when the plane "Columbia" landed in Eisbaden, Germany, on June 6th, 1927.

For the second time within a period of two weeks, Thompson Valves had demonstrated their dependability in an undertaking that drew the attention of the entire world.

During the Columbia's 3911-mile flight,



the eighteen Thompson Valves of the rugged Wright "Whirlwind" motor operated continuously in a stream of explosive flame. The unusual durability of these specially-processed valves proved more than adequate in this flight, as it has in practically every major American endurance flight since 1925.

Repeated evidence such as this has led to the specification of Thompson Valves for today's finest American aero motors.

THOMPSON PRODUCTS, INCORPORATED
General Offices: Cleveland, Ohio, U. S. A.
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Thompson Valves

(*Minnesota News Continued*)
duced into the House of Representatives by Congressman Melvin Maas of St. Paul.

ST. PAUL is now the air terminus on the Twin Cities-Chicago air route, which is operated by Northwest Airways, Inc. The company recently completed the construction of a hanger and administration building on the St. Paul Municipal Airport and schedules of the Northwest airmail planes were changed slightly.

Eastbound planes will leave St. Paul instead of Minneapolis and will likewise end their west-bound trips at St. Paul. Two planes leave St. Paul fifteen minutes earlier, head for Minneapolis and then continue their former route.

THE annual meeting of the St. Paul Aviation Club was held July 9. Final plans for the Third International Goodwill Tour to Winnipeg were made, at least twenty planes of the Club participating. The planes left St. Paul July 14 and 15, arriving at Winnipeg, on the 15. The Winnipeg Flying Club, which recently sponsored the Winnipeg Goodwill Flying Tour to St. Paul, requested the St. Paul Aviation Club to participate in the Manitoba Jubilee Celebration, July 15.

Charles W. (Speed) Holman was re-elected president of the flying club, and Ray J. Dunlap was elected first vice president. A. E. Johansen was named secretary, and J. C. Kelly, treasurer.

New members of the board of directors are: Anthony J. Conroy, Thomas Lane, W. J. Cleland, and Julius L. Perlt. The hold-over members are Charles W. Holman, Roy J. Dunlap, Arsene Nakashian, W. Magee and Roy Miller.

IOWA

[R. W. MOORHEAD]

A WEEK END air passenger service to Lake Okoboji, Iowa's principal summer resort, has been established in Des Moines by Yellow Cab Airways.

A seven-passenger Fairchild monoplane, known as the Okoboji Air Special and piloted by Leo Brennan, is used. It is planned to have the plane leave Des Moines every Saturday at noon, stop in Fort Dodge for passengers, and reach Lake Okoboji in two hours. The return trip to Des Moines is made on Monday, leaving at seven A. M.

THE city council in special session at Muscatine, Iowa, recently voted to purchase the Muscatine Airport. The resolution to assume possession of the airport contained several provisions. The present shareholders must donate and deliver ninety-nine per cent of the $9,000 outstanding stock to the city within sixty days. The Iowa Electric Company must deliver possession without charge of its high tension lines within the city and its high tension electric line to the airport.

By purchasing the airport, the city acquires $7,000 worth of lighting equipment from the Government.

The cost of the entire airport to the city will be $5,800, the value of a mortgage outstanding against the airport. The field is 160 acres in extent and contains a hangar.

CONSTRUCTION of a $40,000 hangar at the Iowa City Airport was started in July by the Boeing Air Transport Company. Plans call for a structure to house two trimotor planes or six to eight smaller craft. It will be used primarily as a loading station.

THE Early Bird Flying Club, organized by business men and women who wish to learn to fly and cannot find time to attend regular classes, has been organized at Des Moines. Merrell Boyce is president, and K. F. Henkle is secretary. The club has formulated a contract with Yellow Cab Airways, Inc., whereby the club will rent an airplane and instructor for the use of the student members. Flight instruction will be given early in the morning. Bob Guerrant, instructor for Yellow Cab Airways, will be senior instructor.

AN air carnival was held at Ida Grove recently in conjunction with the formal opening of the airport. Thirty-seven planes participated in the program. Pilots from several states competed for $650 in prizes.

W. I. SAUL, president of the Saul Aircraft Corporation, Carroll, Iowa, has announced that his corporation will start an expansion program. The factory will be enlarged and employes added. The corporation makes the Triad, a trimotor, four-passenger cabin monoplane.

THE 1930 Iowa good-will air tour was held recently. Sixty planes participating in the tour flew a total of 125,000 miles, visiting thirteen towns on the route. George Yates, Des Moines, was chairman of the tour.

THE Dubuque Airways, Inc., of Dubuque, Iowa, recently formed by twelve Dubuque men to take over the local airport, is capitalized at $25,000. The airport was established two years ago by William McBoyle and has been unused during the past few months. The local corporation plans to make several major improvements. The company's officers are Edward B. Tegeler, president; J. W. Zehetner, vice president, and Donald Meissner, secretary and treasurer. The company has purchased a Stinson and a Waco and has engaged DeWitt Collins of Cedar Rapids as pilot.

NEBRASKA

[J. R. LOWELL]

ASSERTING that the State's four-cent gasoline tax is not an excise tax but a property tax, the attorney for the Boeing Transport Company argued the law's constitutionality when it taxes gasoline used in interstate commerce, before District Judge Chappell recently at Lincoln. The attorney was contesting the State's demurrer to suit brought by the Boeing company, asking an

(*Continued on next page*)

NEW PUBLICATIONS

Brief Reviews of Texts, Handbooks and Novels of Aeronautical Interest

Parachute

By CHARLES J. V. MURPHY

MR. MURPHY tells the story of the parachute, showing that it is as essential to aviation as the air. He describes the development of the parachute from its use by exhibition and stunt flyers to the point where it is a life preserver for those caught in disabled aircraft. The pioneering work and painstaking experimentation involving necessary and spectacular tasks are described. He tells the story of the men who risked their lives to perfect the construction and use of the parachute in an exciting narrative built upon the actual facts.

The A.B.C. of Gliding and Sailplaning

By MAJOR VICTOR W. PAGE

THIS work is intended as a simple and authoritative text book on the operation and construction of gliders and sailplanes, and contains 283 pages of text and seventy-two specially made engravings. A reprint of the U. S. Department of Commerce regulations concerning the building and flying of gliders is given. This book is especially written to meet the needs of schools and glider clubs for group study as well as the individual for study at home. The contents include the following: Early glider development; the soaring of birds; glider development; sailflying; gliding and soaring terrain; pilot training; German sailplane construction, and materials used in glider construction. Major Page is the author of several standard text beeks on airplanes and engines.

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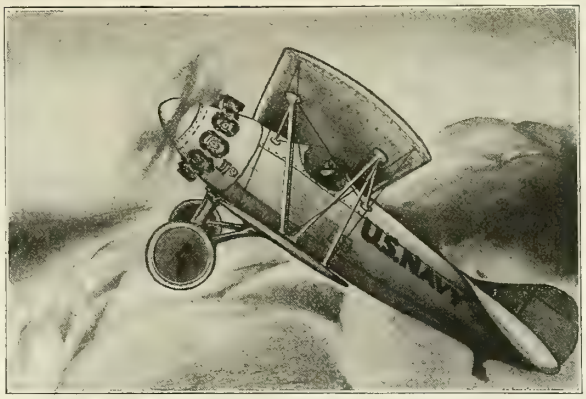
By ALEXANDER KLEMIN

WRITTEN on the premise that aerodynamics, in its fundamentals, is surprisingly simple, the author has acted on the principle "that there is no fundamental principle in aerodynamics which cannot be understood by anyone willing to take a little trouble, and provided such principles are clearly and simply set forth." The mathematics used are kept down to the veriest elements and a review of the mathematics involved may be read in a couple of hours.

Patents, Trade-Marks, Copyrights—Law and Practice

By OSCAR A. GEIER

THIS volume, written in terms the business man can understand, contains information on American and foreign patents and trade-marks. The fifth edition, which was recently issued, has been revised to conform with the changes in the law and practice since the fourth edition was published in August, 1928. The section on patent law includes information on obtaining a patent, importance of specifications and claims, patent interferences, reissues, appeals and infringement suits.





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(Nebraska News Continued)

injunction to prevent State officials from collecting the tax on gasoline utilized by the company exclusively in interstate airplane traffic.

Transaction in interstate commerce cannot be taxed, the Boeing attorney declared, in asking that the State's demurrer be overruled to permit a trial of the case. Pointing out that the company he represents imports its own gasoline from Oklahoma, he contended that it was a hindrance to interstate commerce to require payment of a tax merely because it was unloaded in this State for use in the company's interstate planes.

Assistant Attorney General Ayres of Nebraska based his argument on the fact that the Boeing company maintained two ports in Nebraska, making it difficult to determine the portion of the gasoline used in its planes devoted to interstate commerce and that consumed in transporting passengers, mail and freight between the two Nebraska ports.

A DEVICE designed to retard the formation of ice on airplane wings has been developed by the technical staff of the B. F. Goodrich Company in coöperation with the inventor, Dr. William C. Geer, formerly vice president of the company. The equipment includes a rubber surface; a special oil which does not deteriorate rubber and which causes minimum ice adhesion when applied to the rubber surface; and a mechanical arrangement to shatter and blow away thin ice sheets which may form on the surface.

The apparatus is installed along the leading edge of the wing where ice usually forms when flying in cold weather, and is operated by the pilot from controls in the cockpit.

E. J. SIAS, president of the Lincoln Flying School, has been appointed by Governor Weaver to attend the National Legislative Air Conference at Chicago, August 18-20.

THE Lincoln Aircraft Company has perfected the "Lincoln Rocket," a twenty-five horsepower engine designed for light planes and gliders. A recent run of thirty-five hours on a block test was completed with satisfactory results. The Lincoln company will, in addition to producing these engines commercially, place a small plane on the market equipped with this power plant.

The Lincoln company recently test flew its first cabin plane, a three-place Kinner-powered high-wing monoplane. The ship may also be powered by the new Kinner 125-horsepower engine for which an A. T. C. was recently granted. The plane will be known as the Lincoln A-P (All-Purpose) and was designed by the company's engineers under the direction of V. B. Koriagen and Encil Chambers.

BUSINESS men of McCook have organized a flying club and purchased a Gipsy Moth to be used for training.

THE Lincoln Flying School has added an OX-5 powered Eaglerock biplane to its flying equipment, bringing the total number of planes operated by the school to eight.

OMAHA

[C. P. RODMAN]

MERGING of seven air companies into one, the Rapid Air Lines, Incorporated, was effected at Omaha July 10. The combined companies, while not closely allied, have been working together for some time. They are as follows: Rapid Air Lines, Inc., Rapid City, So. Dak.; Rapid Air Lines, Inc., Huron, So. Dak.; Pioneer Air Lines, Inc., Watertown, So. Dak.; Dakota Air Lines, Sioux Falls, So. Dak.; Rapid Aviation, Inc., Omaha; Rapid Air Transport, Omaha; and the Halley Management, Inc., Omaha.

Officers of Rapid Air Lines, Inc., are as follows: Walter F. Halley, Omaha, president; S. R. Halley, Rapid City, vice president; George D. Kane, Chicago, secretary; and Donald M. Halley, Omaha, treasurer. The officers, together with Earl H. Reynolds of Chicago, constitute the board of directors.

Rapid Air Lines, Inc., operates twenty-six planes, ranging in size from the Aeronca to the fifteen-passenger Ford trimotor transport. At present, the company is operating a daily passenger service between Omaha and Kansas City, and contemplates several others in the near future. Offices are located in the Fontenelle Hotel building.

WITH the title to several pieces of land lacking, the actual construction on the Bellevue Airport has been delayed awaiting clearance of this difficulty. Title has now been secured, except on three small plots, and an insurance company has underwritten those.

Work on this port was to begin July 21, and push forward as rapidly as possible after that date. Bellevue is six miles south of Omaha, and easy of access by train, auto and tram cars.

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UNIVERSAL AVIATION SCHOOLS

A. M. L. A. MODEL CONTESTS

(*Continued from page* 102)

U. S. A. which went to second place winners in the senior divisions of the indoor, outdoor and scale model events; $3,200 in cash prizes; 48 cups; and 150 bronze medals. William B. Stout furnished $175 as a prize fund for the fuselage event, and Berry Brothers Varnish Company furnished $25, which went to John F. Roche, Kansas City, and special awards for the best paint jobs on scale model planes. In the three main events $200 went to first place in both divisions; second place, $100; third, $75; fourth, $50; fifth, $30; sixth, $20; seventh, $15; eighth, $10.

The first eight in senior and junior divisions of each event and the first three in the fuselage event follow:

Senior Indoor: 1st Ray Thompson, 17, Detroit, Michigan; 2nd Carl Goldberg, 17, Purchase, New York; 3rd Fay Stroud, 17, Detroit, Michigan; 4th Herbert Owbridge, 18, Oakland, California; 5th Ted. E. Jacques, 18, Portland, Oregon; 6th Jack Sanderson, 16, Portland, Oregon; 7th Jack Kazanjian, 16; Detroit, Michigan; 8th Phil T. Copeland, 17, Detroit, Michigan.

Junior Indoor: 1st Henry Rainey, 15, New Hudson, Michigan; 2nd Richard Post, 15, Detroit, Michigan; 3rd Paul Nichols, 14, Oakland, California; 4th Julius Wile, 15, New York City; 5th Jack Kistler, 15, Detroit, Michigan; 6th Arthur Boland, 15, Brooklyn, New York; 7th Gordon Christoph, 15, Chicago, Illinois; 8th Robert Meagher, 14, New York City.

Senior Outdoor: 1st Joseph Ehrhardt, 17, St. Louis, Missouri; 2nd Lawrence Hankammer, 20, Des Moines, Iowa; 3rd William S. Vilda, 17, Cleveland, Ohio; 4th Herbert Fish, 20, Akron, Ohio; 5th Milton J. Scharff, 19, Memphis, Tennessee; 6th Edward Becvar, 16, Chicago, Illinois; 7th Edward Guth, 17, Syracuse, New York; 8th Casimir Leja, 17, Chicago, Illinois.

Junior Outdoor: 1st Donald C. Burnham, 15, West Lafayette, Indiana; 2nd Andrew Madison, 15, St. Louis, Missouri; 3rd Ralph W. Kummer, 14, St. Louis, Missouri; 4th William Campbell, 15, Chicago; 5th Edward Beshar, 14, New York City; 6th Adolph Duda, 15, Rome, New York; 7th James R. Bent, 15, Wilkinsburg, Pennsylvania; 8th Richard Kell, 15, West Lafayette, Indiana.

Scale Model—Senior Division: 1st William Chaffee, Dayton, Ohio; 2nd George Schairer, Summit, New Jersey; 3rd John Szewczyk, Easthampton, Massachusetts; 4th Chang Ha Kim, Honolulu, Hawaii; 5th William McCance, Windsor, Ontario; 6th Bertrand Trombley, Bay City, Michigan; 7th Robert Willoughby, Kansas City, Missouri; 8th Chalmers Stewart, Akron, Ohio.

Scale Model—Junior Division: 1st Kenneth Mudie, Detroit, Michigan; 2nd Lawrence McClellan, Fletcher, North Carolina; 3rd Louis F. Mahon, Iowa City, Iowa; 4th Henry J. Obley, Cleveland, Ohio; 5th Thomas Shields, Detroit, Michigan; 6th John A. Winter, Windsor, Ontario; 7th Walter Weiland, Detroit, Michigan; 8th James Shields, Detroit, Michigan.

Stout Outdoor Fuselage: 1st Joseph Ehrhardt, St. Louis, Missouri; 2nd Theodore Carpenter, Montclair, New Jersey; 3rd John Reeves, Champaign, Illinois.

FOLLOWING completion of tests at Anacostia, D. C., the XFJ-1, the fighting plane built for the United States Navy by the B-J Aircraft Corporation, formerly the Berliner-Joyce Aircraft Corporation of Baltimore, Md., will be taken to Hampton Roads, Va., for tests of its arresting gear. After these tests the plane will be returned to the Baltimore aircraft plant for installation of floating gear. In addition, a specially modified design of a Townend ring, modeled along lines developed by the National Advisory Committee for Aeronautics, will be installed and "doughnut" wheels substituted for the present equipment. The addition of the ring, which will straighten out the flow of the air passing the engine, and the doughnut wheel installation is expected to add considerably to the speed of the plane, which is understood to be about 180 miles an hour.

HUNTINGTON Flying Service, Stratford, Conn., have been appointed dealers for Connecticut and Western Massachusetts for Savoia-Marchetti amphibions.

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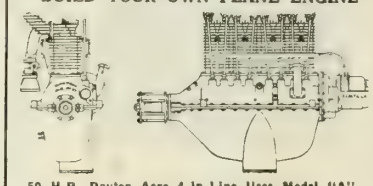
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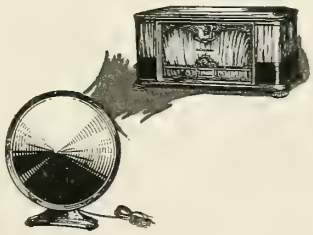
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FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

ENGLAND

King's Cup Air Race Held

ANOTHER woman airplane pilot has completed a flight of major significance in British aviation. For the first time a woman has won the King's Cup Air Race, held this year on July 5, Miss Winifred Brown completing the course ahead of eighty-seven competitors. On June 4, Miss Amy Johnson, another English woman pilot, completed a 9,900-mile flight from London to Sydney, Australia, in nineteen days.

The King's Cup race began and ended at the Hanworth Air Park, near London, and covered a distance of 750 miles around England with four control stations designated on the route. Miss Brown was the fourteenth to start, having a handicap of two and one-half hours. She landed in seventh place at Bristol, was third at Manchester, and held first place at Newcastle which was the turning point on the course. At Hull, the last of the four stations, Miss Brown was nine minutes ahead of her nearest competitor.

Miss Brown flew an Avro Avian powered with a Cirrus Mark III engine of 85-95 horsepower. She covered the course at an average speed of 102 miles per hour.

A. S. Butler, piloting a DeHavilland Moth, won second place. He landed at the Hanworth Air Park thirteen minutes after Miss Brown had completed the race. Lieut. H. R. D. Waghorn, winner of the Schneider Cup Race in 1929, was third. He flew a Blackburn Bluebird and made an average speed of 99.5 miles per hour. Mrs. A. S. Butler, wife of the runner-up, flying a DeHavilland Moth, was fourth. There were no serious accidents. A number of planes were forced down during the race as the result of engine trouble and other causes.

FRANCE

THE name of the Ecole Superieure de l'Aeronautique has been changed to Ecole Nationale Superieure de l'Aeronautique. The school trains engineers for the National Air Corps and prepares students for commercial aviation. The courses are open to both French and foreign students and require three years to complete. The cost of tuition is about $120 per year. Foreign students must be at least seventeen years of age. Applications must be received one month before the entrance examinations held early in the fall.

A NEW airport will be developed near Paris for the use of commercial planes. Nearly one-third of an appropriation of $17,000,000, included in the National Development Bill for the Air Ministry, will be used to construct the field. The airport, which will be located at Maisons-Laffitte on the River Seine, according to present plans, will accommodate both landplanes and seaplanes. Le Bourget, the airport now serving Paris, will continue as a military field.

APPARENTLY four new world's seaplane records were established by Lieut. P. Paris in a flight of twenty hours and twenty minutes June 21-22 at St. Laurent, France. The new records claimed by Lieut. Paris are as follows: distance of 2,853 kilometers (1,177.1 miles) carrying a load of 1,100 pounds and 2,200 pounds; duration for seaplanes carrying a load of 2,200 pounds; and speed of 146.76 kilometers per hour (91.13 miles per hour) for planes in this category over a course of 2,000 kilometers.

GERMANY

[P. A. HEINZE]

WHEN the first Scientific Sailplane Congress was held in March of this year at Darmstadt, Germany, the Rhoen-Rossitten Society, the organizer, suggested to the numerous representatives of foreign nations present the foundation of an international organization for the purpose of carrying on coöperative research work and sport development in the field of sail-flying. This suggestion found ready support and, the delegates having in the meantime procured the assent of their national organizations, they again met on June 14 under the auspices of the Rhoen-Rossiten Society at Frankfurt-Main at the International Research Committee for Motorless Flight.

Delegates of the following nations and organizations were present: the Aero Clubs of Belgium, Holland and Italy; the French sail-flying society, Avia; Royal Aeronautical Society; and the British Gliding Association. Germany was represented by the Rhoen-Rossitten Society, and Hungaria by her Consul. The vice president of the Aero Club of Barcelona, Archduke Franz Joseph von Habsburg-Bourbon, was present as a guest.

Each country will be represented by four members in this committee and on the German side the following have been appointed as delegates: Professor Dr. Georgii, Professor Dr. Hoff, von Hoeppner, and Civil Engineer Ursinus of Frankfort-Main. Professor Dr. Georgii was elected to the office of president, and as vice presidents the following were appointed: Mons. Massenat of Paris, president of the Avia; Major Massaux of Liege, Belgian sail-flier; and the Master of Sempill, president of the Royal Aeronautical Society of Great Britain. Count Dr. Ysenburg was elected general secretary. The office of the organization will be in the rooms of the Rhoen-Rossitten Society at Frankfort-Main, Schubertstr. 10.

The committee, which intends starting work at an early date, has elected scientific, technical, sports and publicity sub-committees.

THE development of rockets as a means of propulsion is continuing gradually but effectively in Germany. A number of experimenters are independently and secretly working to solve the problems of rocket-propulsion.

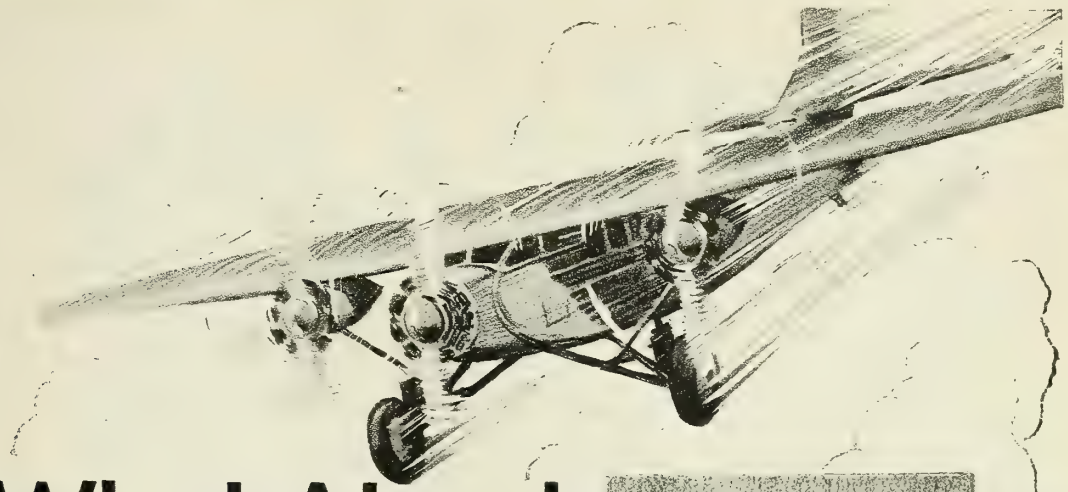
Nothing has been learned for quite a while of the work done by Fritz von Opel in collaboration with Sanders. We recently heard that the work is being continued and that it is advancing well.

THE outlook for aviation in Germany is at the moment somewhat brighter than it has been for a long time. The government, in its present budget, has reserved a considerably larger amount for the support of aviation in Germany than last year. The sums of 40,000,000 marks ($9,500,000) and 19,000,000 marks ($4,500,000) are to be given to Luft Hansa; 12,500,000 marks ($3,000,000) are to be utilized for the support of the aircraft industry; 3,100,000 marks ($740,000) are to be spent for the construction of the new Zeppelin; 2,300,000 marks ($545,000) will be spent on the training of transport pilots; 1,600,000 marks ($380,000) have been granted to the German Aeronautical Research Institute; 3,000,000 marks ($715,000) are to be devoted to the maintenance and development of ground organization, safety measures, night flying and special research work; and 300,000 marks ($71,500) are to go towards the support of the sail-flying movement.

The German Aviation Union held its annual assembly June 20-23 at Kassel. A report is scheduled to be published in the next issue of AERO DIGEST.



Focke-Wulf S-24 Keibitz powered with Siemens 60 h.p. engine



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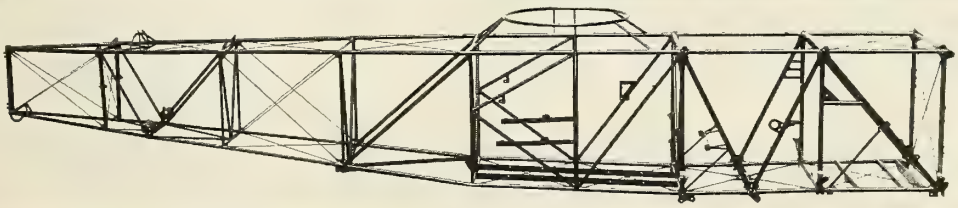
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NATIONAL-SHELBY AIRCRAFT TUBING

CANADA

[J. MONTAGNES]

PLANES operated by the Ontario Provincial Air Service were in the air a total of 11,500 hours during the six-month season in 1929. Up to the middle of June of this year, planes of the company had flown 1,114 hours more than in the corresponding period in 1929.

Fourteen DeHavilland Moth seaplanes equipped with pontoons, completed a total of 1,123 hours in May of this year. From June 1 to 15, these ships completed 885 hours of flying. Pilots flew on an average of seven hours a day.

THE annual Indian treaty flight started July 2 from Ottawa with two Royal Canadian Air Force planes in charge of Flight Lieut. Dave Harding and K. Rose. On board were H. N. Awrey, Dominion Commissioner for Indian Treaties, and W. C. Cain, Deputy Minister of Lands and Forests for Ontario.

The flight is made in connection with the payment of treaty money to Indians who signed the new Indian treaty last summer. The flight will require more than six weeks, cover 2,500 miles, and touch remote territory in the possession of the aborigines.

[A. F. ROBERTS]

ONE of the last jobs undertaken by the three Boeing flying boats of Western Canada Airways Ltd. before the fisheries patrol season started, was the dusting of Stanley Park, Vancouver's natural playground, and the Seymour Creek watershed area. Trees were sprayed from the air with calcium arsenate. Special hoppers with a capacity of 500 pounds each were built into the Boeings and fourteen tons of poison were sprayed by the three flying boats, working from a supply scow moored near the scene of operations.

R. CARTER GUEST, former instructor of the Toronto Flying Club, has been appointed civil aircraft inspector and an officer of the aircraft inspection department of the Royal Canadian Air Force. He has charge of checking all aircraft in British Columbia and of examining all candidates for pilots' certificates.

MEXICO

[M. HURST]

CIA. MEXICANA DE AVIACION has moved from its Moralillo field in Tampico to its new flying field north of the city on the Altamira road. Construction of the company's permanent offices and passenger station at the field will be delayed for some time, and in the meantime a frame building will be used. A gang of telephone workers has been busy, running a pole line to the air field, which work was recently completed. There will be no hangars erected at the new flying field as it will be an intermediate one and not a terminal, the company's spare planes being housed at Brownsville, Mexico City and Tejeria.

ADDITIONAL flying and landing fields will be established soon in various parts of Mexico. New fields will be developed at Fresnillo and Rio Grande, Zacatecas, on the Mexico City-Ciudad Juarez line.

GENERAL Juan F. Azcarate, former chief of the aeronautical department of the federal government, made a trip to New York City recently to purchase forty airplane engines. They will be used to power planes manufactured in the government airplane factory, Mexico City.

CONTRUCTION of an aviation field at Saltillo has started. Approximately 10,000 pesos will be expended on the development of this airport. The field will be built on the property of Pedro Quintanilla and will be used principally by the C. A. T. lines, which will include Saltillo on its stops on the daily flights between Matamoros and Mazatlan. Colonia Lourdes, where the flying field will be built, may be enlarged at a very small cost any time it is desired. Dimensions of the new Saltillo flying field will be about 3,000 feet in length and 3,000 feet in width.

THE first million miles of flying were recently completed by the Corporacion Aeronautica de Transportes, according to an announcement of Luis Adame, Monterrey representative of the company. The company began its operations in March, 1929, with the opening of the transcontinental route as far as Monterrey. On April 9, 1929, the first round trip was completed between Brownsville and Matamoros.

AN aviation school, similar to that at Monterrey, will be opened shortly in the capital of Chiapas.

A PETITION has been presented by Governor Bartolome Garcia Correa to the Department of Communications for authorization to establish a school for civil aviation in the State of Yucatan, at Merida. In the petition the Governor points out that there has been established there a flying field provided with hangars and a building for the school in which instruction may begin at once. Three airplanes are available for flight instruction.

NEW air lines will be established which will unite distant parts of the state of Oaxaca with the capital and provide communication facilities with Mixteca, the coast and the Isthmus of Tehuantepec. Preliminary work is now under way.

PERU

[H. GOMEZ-CORNEJO]

AFTER shipment by rail as far as Jauga by the Central Railway, one of the new Boeing 40 B biplanes recently acquired by the Peruvian Government from the United States for service with the Naval Air Line to Iquitos, was flown by Capt. Leonardo Alvariño to the San Ramón airport, western terminal of the San Ramón-Iquitos Air Line. A Douglas cabin monoplane was recently shipped directly from the United States to Iquitos. This plane will be used between Iquitos and Massisea. The total equipment of the Peruvian Naval Air Line is composed of four Keystone two-passenger open cabin biplanes, one Boeing 40 B and a Douglas cabin monoplane. Three landplanes are in service between San Ramon and Massisea and three seaplanes in the Iquitos-Massisea service.

ON account of the facilities offered by the Ministry of Marine and Aviation, Panagra will construct at the Military Airport of Las Palmas a modern all-metal hangar. Work has commenced in levelling the ground and setting the concrete foundations on which the building will be erected.

THE *Pilot Radio*, a Stinson monoplane in charge of Capt. Louis Yancey on a good will flight throughout Central and South America, arrived at Talara, Northern Peru, June 8, on a flight from Cristobal to Talara in eleven hours and twenty-five minutes. On the following day he left for Lima, where he arrived after a fight of six hours, twenty minutes. Capt. Yancey and E. Bungin, who acted as co-pilot of the plane, were received a few days afterwards by President A. B. Leguia.

THE progress of Peruvian military aviation since the year 1924 is as follows (Year, number of airplanes, hours flown): 1924, twenty, 443; 1925, twenty, 608; 1926, fourteen, 326; 1927, ten, 455; 1928, four, 705; 1929, five, 1,641.

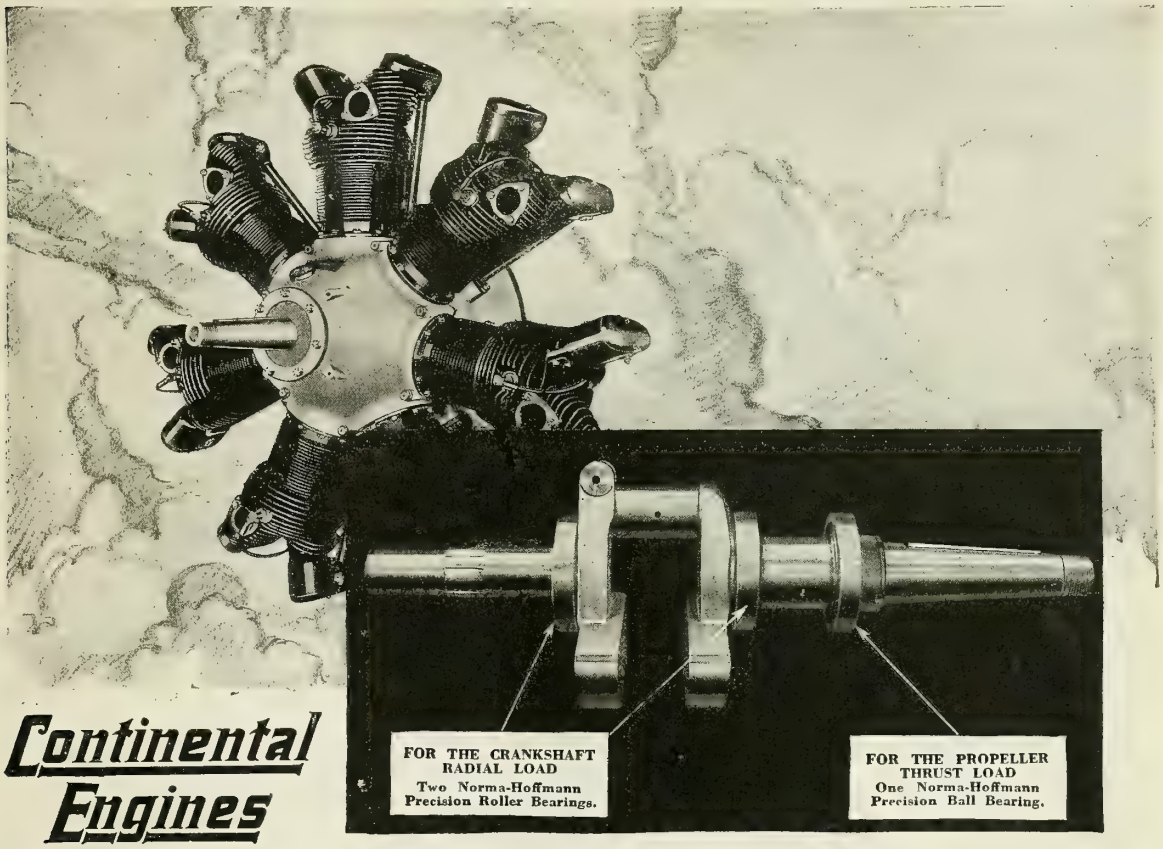
From these figures it is shown that with twenty planes in 1924, only one-third of the number of hours were flown as compared with 1929. These five planes last year were used mostly for training purposes.

CHILE

[H. C. PLUMMER]

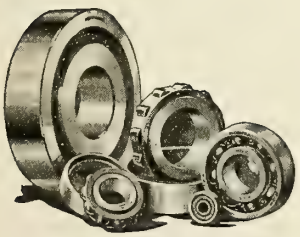
TRANSFER of the aviation branches of the army and naval services to an independent jurisdiction and the placing of Chilean commercial aviation units under government supervision have been effected as the first steps toward the creation of a Ministry of Aviation, as promulgated by a recent decree of President Carlos Ibanez C. Pending the establishment of the new Ministry, the several aviation services will be subject to control by a Sub-secretaria de Aviacion responsible to the Ministry of the Interior.

The decree of President Ibanez implies that the government has been compelled to combine the aviation services "to the end of obtaining greater efficiency and a better unitormity in organization and in training, and with less waste of effort and public monies." The most intensive organization and coördination not only of aerial, but of land and sea transportation, is dictated, the decree states, by the physical characteristics of the Chilean terrain, which is broken by obstacles that impede the establishment of rapid communication.



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Photo Morris Rosenfeld, N. Y.

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SOME NOTES ON GLIDER FLYING

(*Continued from page* 39)

between the launching crew. The two men comprising the launching crew then walk out and stretch the cord out as far as it will go. The student pushes the stick all the way forward, and then commands the tail man to let go. If the pilot keeps the stick forward, the glider makes a nice ground slide. This is done to teach the student to keep the wings level; it should be practiced about a dozen times. At this stage one will naturally be anxious to get into the air, but it is more advisable to go slowly and learn well.

After these preliminary trials, the student should be ready to make a short hop. With the same launching crew and with the stick in neutral, a short flight can be made by letting go as before. There are not enough men on the rope to shoot the glider very far, but as soon as the glider is in the air, the pilot should push the stick *gently* forward. He should not pull back on the stick until he has made a number of short hops and acquired the feel of being off the ground.

After a number of such short hops, a take-off can be made with two men on each end of the shock cord. This flight should be made as close to the ground as possible, and should not be too long.

The next flight can be five or six feet above the ground and as long as the pilot can stretch it. Thereafter, the student can learn to climb and make still longer flights until he is ready for his third class license test, thirty seconds straight away.

Auto Towing Method

In many localities where it is too far to a hill to use the launching method, auto towing take-offs are necessary. To obtain the best results from preliminary practice in auto towing, the glider should have a landing gear, one that allows the wings to have a certain amount of side motion.

The novice ought first to be towed around the field below flying speed, or about fifteen to twenty miles an hour in calm air. The speed of the wind will, of course, influence the rate at which the glider is towed over the field. If there is a ten-mile breeze, for instance, the towing speed into the wind should not be over ten miles an hour.

This towing on the ground should be continued until the pilot is able to keep the wings level and the tail level—that is, until he can control the glider so that the tail does not drag or the nose dig in.

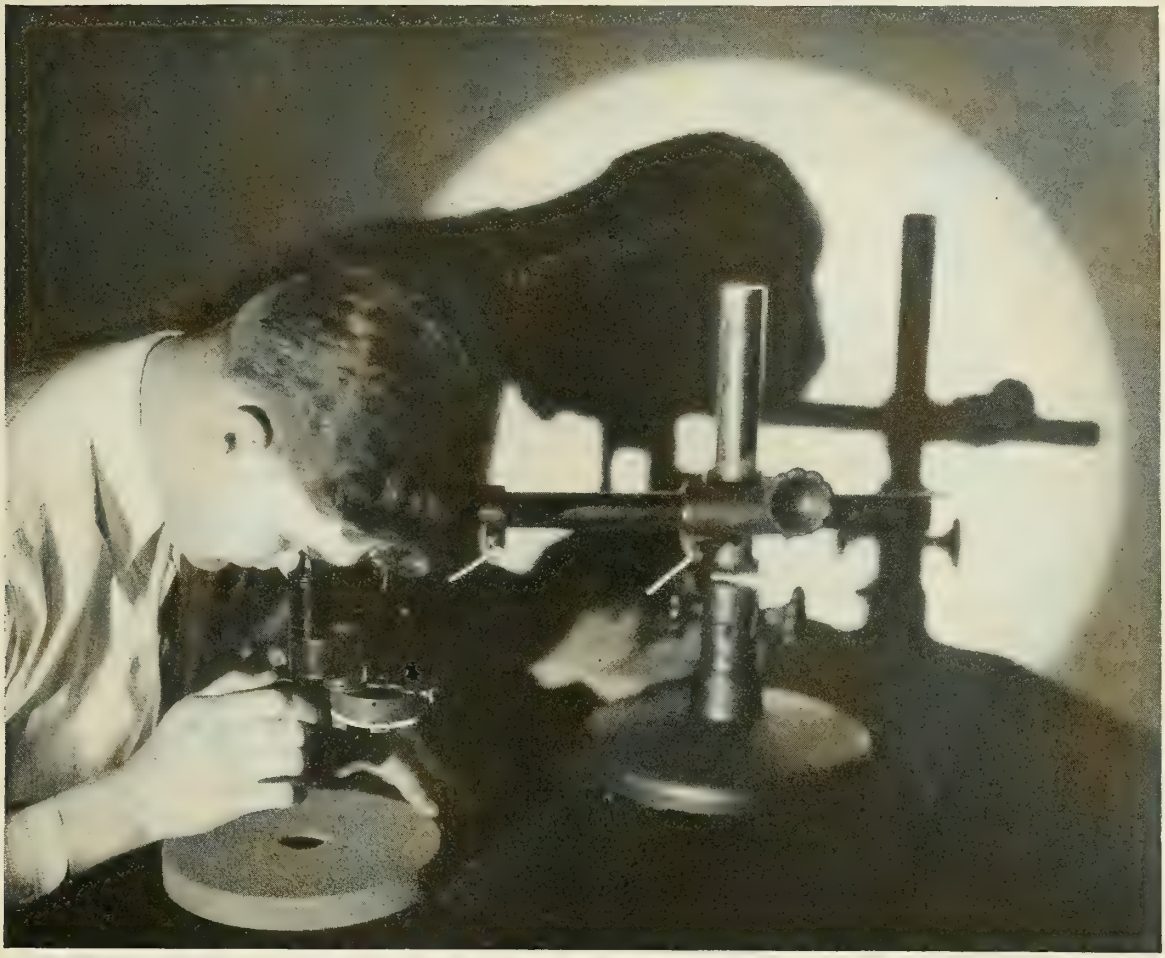
The landing wheels should then be removed, because with them attached a side-ways landing will damage the gear or the fuselage, whereas a side landing on the skid will do no harm to a good glider.

When ready to attempt a flight, the pilot should ascertain the wind speed in order to know at what ground speed the auto must travel. If it is five miles an hour and the glider gets off at twenty-five, the towing speed should be thirty miles an hour, or ten miles faster than the take-off speed.

It is very important not to fasten the towing cable to the car, but rather to have a couple of turns wrapped around some part of the car with someone holding the end. If the student should get excited and forget to cut loose, the person holding the cord in the car can cut loose. A glider should never be cut loose when it is climbing, however—in fact, not until it is nosing down.

On the first attempt the stick should be pushed forward

(*Continued on following page*)



THE STRUCTURE OF A GRINDING WHEEL

—precision depends on it.
—high production depends on it.

To control the structure of a grinding wheel has long been the ambition of the grinding wheel maker. Industrial progress has been demanding it—a vital factor in obtaining precision, with high production.

NORTON CONTROLLED STRUCTURE

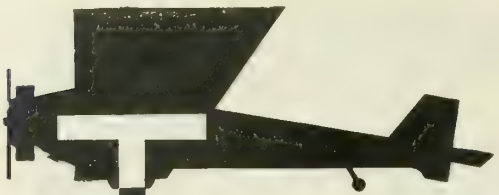
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Testimony

From the Hunter Brothers:



"We want the flying fraternity to know how much credit goes to Deep-Rock Products for our recent successful endurance flight. We stayed up over 553 hours without a sign of engine trouble. On a previous attempt to break the 420 hour record of the St. Louis Robin, we stayed up 263 hours. Between flights, our Wright J-6 engine received only a thorough check and super-inspection. In other words, the engine has 844 hours of practically continuous flying in its history without an overhaul! That's more than unusual -- it's remarkable. We have never used anything but Deep-Rock products throughout the life of this engine. We used Deep-Rock Aero Oil Grade No. 4, Deep-Rock Rocker Arm Lubricant and Deep-Rock Aviation Gasoline. In our experience, there's nothing like Deep-Rock Products and we recommend them to the flying fraternity."

John Hunter
Kenneth Hunter
Albert Hunter
Walter Hunter

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(*Continued from preceding page*)

before starting and pulled back as the speed increases until the glider is off. As soon as the student realizes he is off, he should nose down gently and then cut loose. An unskilled pilot should not attempt a long hop until he has made a number of these short hops. If he attempts to make a long flight before he has practiced enough, a number of things are liable to happen. The ship may nose down and slack the tow cable, with the result that the car will jerk the glider when taking up the slack, causing it to zoom; if the glider is not level or is drifting, the jerk may cause the pilot to lose control.

A mechanical release for tow-launching is of real value in flying by this method, for it can be regulated to the proper tension to give long or short flights as desired and therefore adds greatly to the safety of glider flying.

Perhaps the best way to learn the use of the controls is on a wind-jammer—a set of controls on a T-shaped form mounted on a universal joint, so that it can be rocked and turned in any direction. The apparatus is mounted on a post about four feet high, with the seat directly over the post so that different weights will not change the balance. A weight hung ahead of the rudder bar will balance the tail.

This practice machine can be made out of a couple of two-by-fours to substitute for wings and fuselage, some half-inch material for rudder and flippers and airerons, a few hinges and an old Ford universal joint.

As a last admonition to those who want to make their glider clubs successful—take plenty of time.

PRINCIPLES OF AERODYNAMICS

(*Continued from page* 50)

tinct mathematical characteristics, as has the flow of electricity or the motion of extremely heavy oil. Since we cannot go into that much mathematical detail here, the reader must either search for more information about potential flows in books on the subject or be satisfied to associate potential flows with a mental picture of perfect flow.

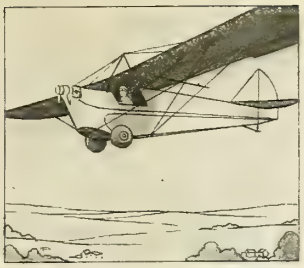
Steady or unsteady flows, two- or three-dimensional, may be potential flows or not, giving eight combinations in all.

The air motion created by an airplane flying straight ahead and with constant velocity is three-dimensional, and although it is no potential flow it resembles one and for many purposes can be considered to be a potential flow. It is at least a steady flow. Except near the propeller it is steady as seen from the airplane. It is not steady, however, as seen by an observer standing on the ground. The same air flow is steady and unsteady at the same time according to whether or not it is seen by an observer moving with the airplane. Whenever possible we shall always observe the flow so as to obtain a steady flow. That simplifies many computations.

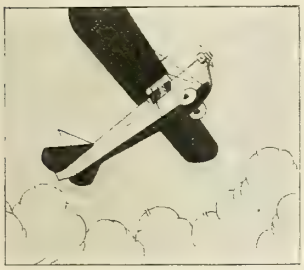
That much about air motions as a whole. For its detail description we often find mentioned "streamline." In a steady flow it is streamlines along which the air moves. In an unsteady flow the air particles do not follow fixed lines. The streamlines are then determined by the direction of motion only. There are always a few points on the surface of the airplane where the moving air seperates and moves to all sides like a water jet hitting a wall. Such points are called "impact points." Streamlines and impact points are used for the description of all kinds of flows.

That gives in all seven aerodynamic terms referring to air motion: two-dimensional, steady and potential flows;

(*Continued on following page*)



ENDURANCE—Recently Stanley C. Huffman kept his fifteen hundred dollar AERONCA up for twenty-six hours . . . nearly nineteen hundred miles.



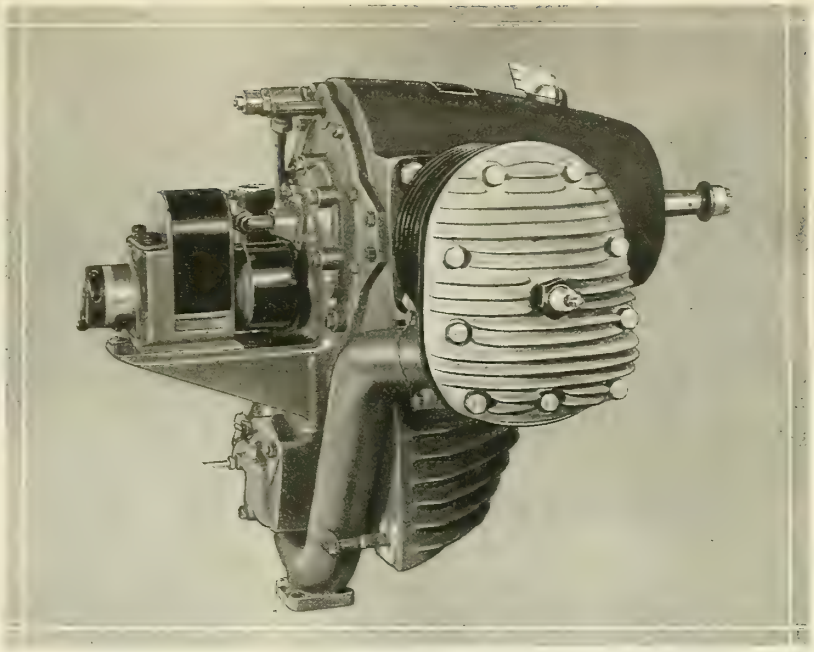
ALTITUDE—AERONCAS have already passed the best previous light plane records by more than 3000 feet . . . and each week sees one going a little higher.



RELIABILITY — From ocean to ocean in a standard AERONCA . . . across swamps, deserts and mountains . . . over the Sierra Nevada range at 13,000 feet . . . without a falter.



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The Aeronca C-2 has gotten a solid foothold in pioneering a truly practical and economical light airplane. Government figures prove conclusively that sales and production on this plane are ahead of any other, regardless of make—and government figures are more reliable than advertising and publicity claims.

As soon as the Aeronca solved the dilemma of designing and building a light airplane—an airplane that was actually **safe** in the hands of a novice—it also precipitated an epidemic of contraptions with wings, gliders with auxiliary motors and various other freak devices, designed primarily to capitalize on the extraordinary interest aroused by the performance of our plane. Frankly, we are both glad and distressed by this turn of events . . . glad, because comparison will increase our own sales . . . and distressed because faulty engineering in hastily designed planes may result in fatalities harmful to the whole industry. As far as competition is concerned . . . we welcome it with outstretched arms because there is a real market for a dozen **safe** types of economical light airplanes.

The safety of an airplane depends on design and engineering: we spent five years and a quarter million dollars to attain it. Economy is another problem entirely. While there are many motors that will operate on two gallons an hour . . there was none that we could use to give our plane the performance it now has. Those that were economical enough were not there when it came to horsepower. Those that had the horsepower were too heavy and too costly to operate. As a result we have the Aeronca E 107 A—our own motor.

The efficiency of this engine is remarkable. It consumes approximately two gallons of gasoline an hour which, at cruising speed, means about 35 miles to the gallon. The compensating parts are of the very finest materials and **all bearings are either ball or roller type.** It develops 30 horsepower at 2500 R. P. M. at a compression ratio far lower than that of any airplane engine made. It is so rugged in construction and so absolutely reliable in its performance that pilots do not hesitate to fly behind it over country that represents potential disaster in event of failure. It is so foolproof in its performance that several records —altitude, distance, endurance—have been far surpassed.

In short, the Aeronca E 107 A motor has made of the Aeronca an airplane that will step out with the best of them, go wherever they go, do whatever they do . . . and have enough reserve on hand to show a few unprecedented tricks of its own. That, essentially represents the difference between a so-called power glider and a **real** airplane of the Aeronca type. We'll gladly tell you more upon request.



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(*Continued from preceding page*)

laminar and turbulent flows; streamlines and impact points. This group of words will go far towards making more intelligible any of the physical laws of the air forces and their computation. All of the terms are used for the description of the air motion, although actually they explain little or nothing.

We proceed now to the air forces acting on solids surrounded by moving air. We realize that there is only one resultant force of that kind at any time, just as each solid has only one weight. This one resultant force can be (and generally is) divided, resolved or split up into portions called components. When you are reclining on a slanting easy chair, your weight can be resolved into one component parallel to your backbone and one at right angle to it. Even then, in referring to such components, no one can say he possesses several weights at the same time. It is equally erroneous to say that an airplane is acted on by different kinds of air forces when referring to the various components of the one resulting air force. Such usage is, however, so frequent that it has become general. We therefore feel compelled to swim with the stream, and shall henceforth refer to the components of the one and lone air force as "air forces."

The most important resolution of the air forces is that classifying lift and drag. Lift is the component of the air force at right angle to the motion. To which motion? We assume the air to be at rest except for a small region disturbed by the airplane itself. There is then a motion of the airplane relative to the undisturbed air, or of the undisturbed air relative to the airplane, and either can be used for the computation of the lift.

This definition breaks down if we consider a small portion of the wing only and refer to its lift relative to the air "surrounding it." This is true also if we refer to the lift of a certain length of the propeller blade. The definition of lift is loose in that case and the reader must by commonsense make up for its inadequacy. He can, for instance, compare the flow in question with one in undisturbed air resembling it most, and substitute the latter's motion for the computation of the lift.

The component of the air force parallel to the motion is the drag. In a steady flow there is always drag to retard the motion; otherwise we should have *perpetuum mobile,* and our universe would go to pieces. The individual drag of one of several solids (or of a portion of a solid) may be directed the other way, but then it is always associated with even larger drags in the positive direction so as to make the entire resultant drag positive.

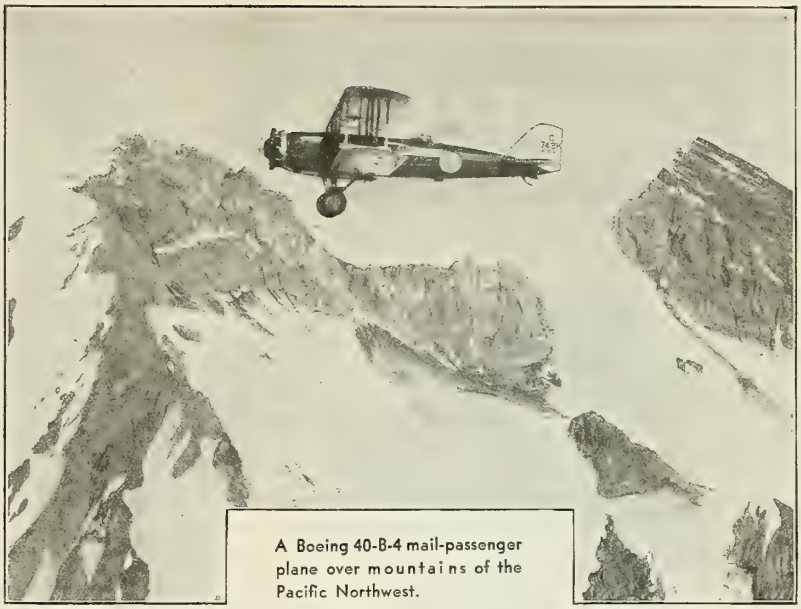
Another resolution of the air force is relative to a direction connected with the airplane. We have, for instance, the tangential force parallel to the propeller axis or to some other line, and the normal force at right angle to it. There may also be a side force at right angle to either. All components put together are always the same as the lift and drag put together: another resolution of the same force.

The knowledge of the air force (or of its components) is not alone sufficient in many cases. We must also know where the air force is located—whether more in front or rear, for instance. The air force may turn the nose of the airplane up or down; the airplane may be tail heavy or nose heavy. The air force possesses a certain leverage with which it acts. This lever effect is expressed by stating the point or points with respect to which there is no such effect. That is the so-called center of pressure. All points on one line parallel to the resultant force are equally cen-

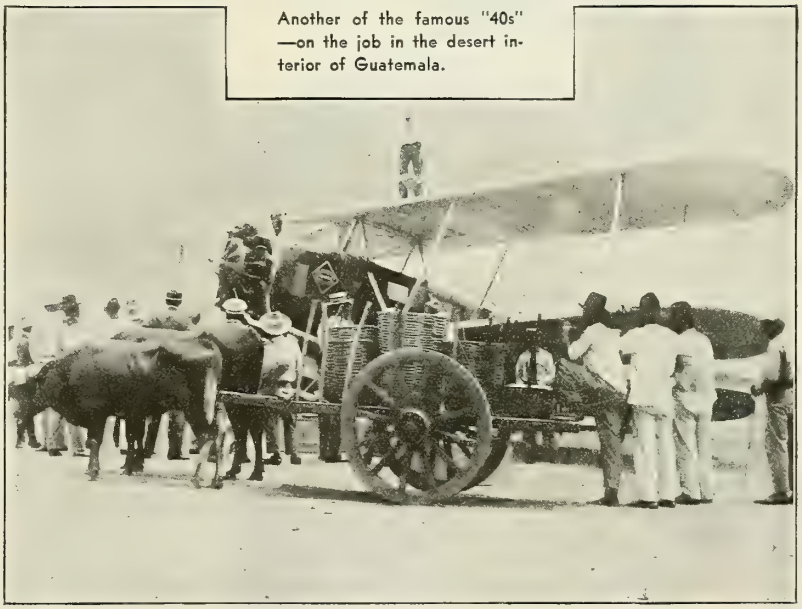
(*Continued on following page*)

NOTHING discourages a BOEING 40-B-4!

From South America to Canada the Boeing "40" delivers where less sturdy planes would falter. It functions faithfully in the heat of a Guatemala desert or the sub-zero and rare atmospheres of mountain heights in winter. No wonder 30% of all U. S. air mail flies in Boeing "40s."



A Boeing 40-B-4 mail-passenger plane over mountains of the Pacific Northwest.



Another of the famous "40s" —on the job in the desert interior of Guatemala.

40-B-4s can now be promised for August delivery.

SPECIFICATIONS

(Performance Guaranteed)

POWER PLANT: A 525 h.p. "Hornet."
HIGH SPEED, 138 m.p.h.; cruising speed, 115 m.p.h. Cruises 4½ hours without refueling.
PAYLOAD, 4 passengers, mail and baggage (1163 lbs.).
12-SECOND TAKE-OFF after 550-ft. run. Lands at 57 m.p.h.
Bonded and shielded throughout for radio; night flying equipment; many special features.

All planes completely equipped.

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AIRPLANE COMPANY

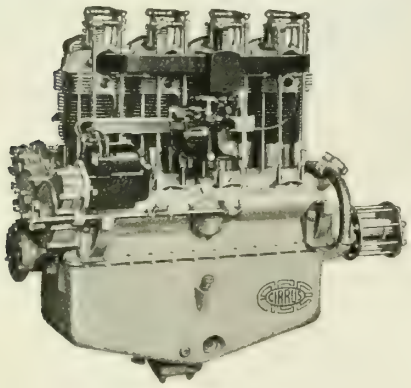
SEATTLE, WASH.

A division of the United Aircraft and Transport Corporation

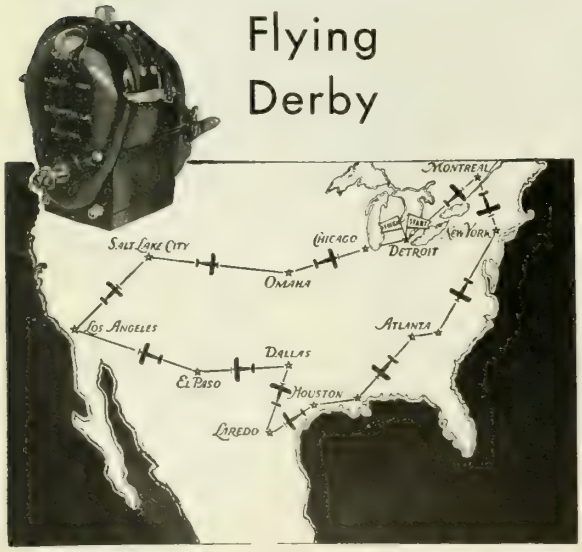
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(Continued from preceding page)

ters of pressures. We mean ordinarily that particular center of pressure that is at the surface of the airplane. This center of pressure has no particular significance compared with the others. It is merely more common to refer to it thus.

Another way of expressing this characteristic of the air force is to give its momentum, force times lever arm, with respect to a specified point of the airplane. With two-dimensional flows only one such moment exists, but in the general case of the three-dimensional flow it becomes necessary to give its components in three directions. Merely to express the resultant air force we then have to give six numerical values in all—three for the force and three for the moment. That is too much for practical application. In the drafting room we confine ourselves to symmetrical cases, and can then get along with three quantities: lift, drag and moment, or center of pressure.

Only one more remark before we leave this subject. The potential flow, among other things, indicates its idealistic nature by the absence of any drag in steady flows. The lift may likewise become zero. This does not necessarily mean that there is then no resultant force or reaction at all. The reaction may be a pure couple, equivalent to a pair of equal and parallel forces acting at some distance in the opposite direction. Such reaction is generally called a couple, or pure couple. A couple has a moment, but it is not itself a moment. In aerodynamic literature the couple is generally called a "moment." Once more we approach the condition of the Tower of Babel, but since everybody uses the term thus, we may as well do it ourselves, and call the couple a "moment."

Lift, drag and center of pressure (or moment) are the technical terms with which we hope to get along for the description and discussion of the air forces.

This is the second of a series of articles on Aerodynamics by Dr. Munk. To be continued in the September issue...Copyright 1930. *All rights reserved by the author.*

CYZING UP THE GNUS

(Continued from page 38)

translated "Mene, mene, tickle Ophelia" to mean that it's dangerous tickling a girl in a bathing suit, especially at Long Beach.

One significant bit of futuristic writing I glean from the gnus is that the coldly sane Mr. Gilbert G. Budwig, Director of Air Regulations for the Department of Commerce, Aeronautics Branch, has put forth a ukase, or message, to the effect that Curfew will ring on the efforts of those who had hoped to startle a somnolent world with the thrilling spectacle of an endurance refueling flight to be accomplished by switching pilots during flight by means of rope ladders and parachutes.

Mr. Budwig, possibly mulling over the fact that plane changes of this character, even under ideal weather conditions, were not considered in the same safety category as rocking-chair endurance contests, may have come to the conclusion that in bumpy weather—which reasonably might be expected occasionally during a 500-hour flight—changing planes was not exactly as simple as getting off a Broadway street car with a transfer in your hand and boarding a 42nd Street Crosstown. Whether or not this had occurred to the bold promoters of the idea I have no means of knowing; but judging from the gnus it certainly must have occurred to Mr. Budwig, for the ukase went forth, and the brave lads were earthbound.

(Continued on following page)

Practical — Interesting — Up to Date — Instructive

The First Handbook of Gliding



Gliding—The Safest, Easiest, Most Economical way to learn to Fly—This new book gives complete instruction program. Tells how to organize a Glider Club and, for a few dollars, own your own glider—Greatest sport of all!

The Complete Manual of Gliding

I am an experienced airplane pilot. When asked to serve as instructor for a Glider Club I found the subject of gliding so new that no book of instruction and fundamental information had ever been prepared. The book now published is based on the most advanced knowledge and most successful methods used in this and foreign countries.

Our glider club members subscribed $10.00 each and bought a good glider. By following the few, simple lessons outlined in this book they became adept pilots in a short time and without a single mishap to any of them.

Gliding is one of the greatest of all sports. Full of fun and thrills, yet safe. A wonderful preparation for airplane piloting.

The Handbook of Gliding answers all questions. Gives safe, quick, practical course of instruction by which anyone can learn to pilot a glider. Tells how to select a glider. How to choose an ideal gliding site. Gives fundamentals of meteorology—winds and air currents. Tells how to organize a club of your own so that you may buy a glider at small expense per member. Gives constitution and by-laws. Goes into fundamentals of glider flight. Interesting. Instructive. Complete.

If you want the latest and best information on gliding send for this book.



Anyone Can Fly a Glider

A few simple lessons and you will be riding the wind with the best of them. A glider club can be organized for as little as $10.00 a member. Learn about this greatest of all sports. Send for the Handbook of Gliding for complete details.

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The Thompson Aeronautical Corporation of Cleveland, Ohio, as the distributors of Avigo Elgin Aircraft Instruments for the Great Lakes region . . .

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(Continued from preceding page)

FLOODS, famines and pestilences we have occasionally in various parts of the world. But floods diminish, famines end, and pestilences depart. Only the parachute jumper remains with us constantly. In fair weather and foul, in rain and shine, in winter and summer, he goes up and dies for the diversion of morons. He seems to rise, Phoenixlike, from his scattered ashes. Probably, if we examined him closely, we would find that it wasn't the same fellow who was flattened out last Sunday who is going up to drop again this Sunday. Doubtless it is a different one. He merely acts and looks the same. The parachute he wears often is not the standard Army pack; it is something we have never seen before and hope never to see again. Certainly, it frequently is something we'd hate like the very deuce to have tied to us as our sole support if we found ourselves alone in the air.

But let me quote Will Rogers on the subject, as reported in the New York *Times*: "We got an epidemic of crazy women parachute jumpers—going just for the jump. Shooting your husband has got so it don't land you on the front page. So, they have traded their guns for parachutes and are trying to jump and land on it. It's never a real aviator that makes an exhibition jump. They know they were made to save useful lives in an emergency and not to put on a show with. We are all against having any more laws, but one against women parachute jumpers we would go for."

Check and double check if you will also include the men.

The parachute is a wonderful contribution to aerial safety, and all jumps executed for the purpose of useful experiment, of training, and of demonstration are worth while and necessary. But this marvelous invention should not be prostituted by making it up in weird, cheap and ignorantly-constructed forms, and then handing it over to a gnat-brained girl or boy for the sole purpose of providing a thrill for nit-wits.

A LITTLE item for the kiddies—if you've got some. Two little members of the Cuckooette Club have been getting themselves into print—and incidentally into the cooling waters of the broad, deep and damp Atlantic. It seems these two little chaps—I don't know them, but they must have been just a pair of tiny tots—got hold of an idea somewhere. I don't know where they got it, I'm sure, but perhaps they were listening to Uncle Toddy or Uncle Don on the radio.

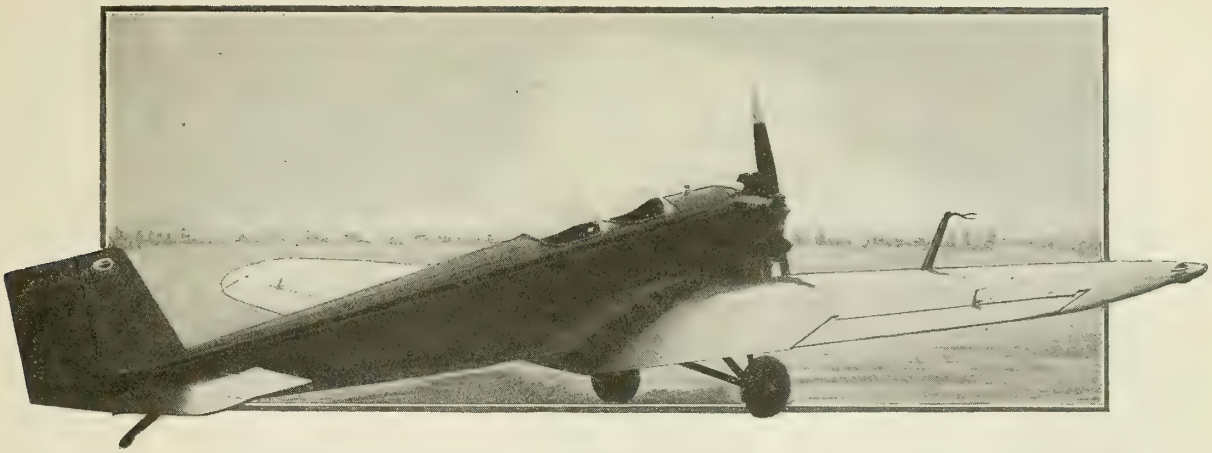
Anyhow, children, crowd around Uncle Cy and put down your cocktails while he tells you the sad story of two little boys and a glider that he read in the gnuspaper.

It seems these two little fellows got a glider and put it aboard an Atlantic liner with the avowed purpose of doing a non-stop glider flight across the ocean, towed by said liner.

The boys were members of the Cuckooette Club, a junior branch of the Cuckoo Club for airplane pilots. This Cuckooette Club is for glider pilots who do the same sort of things in gliders that the same sort of airplane pilots do in airplanes—cuckoo things to get their names in the gnus, or their remains in the hands of the outwardly sympathetic mortician.

Well, most of the way across, the winds were in their favor, holding them safely to the deck of the ship. The non-stop flight promised to become a non-start flop, when as luck would have it the wind changed, off went the boys, snap went the tow-rope, and splash went boys and glider and all, into the sea.

(Continued on following page)



THE AEROMARINE KLEMM OUTCLASSES ALL OTHERS

THERE'S speed written in the straight, flowing lines of the new Aeromarine Klemm. There's "stand-up-and-take-it" ruggedness under its sleek, glistening surface. And there's a constant reserve of smooth, certain power harnessed in the nose of this favorite sport and training plane.

To the flying school operator—the long distance commuter—sportsman—owner—to every flier, the Aeromarine Klemm brings a new, reliable and economical performance. Born as a glider and inherently stable, it flies itself. Responsive, safe, powerful, comfortable . . . the Aeromarine Klemm outranks anything in its class—in both flying performance and price.

More outstanding than beauty, stamina, speed or power, though, is the unheard of economy of Aeromarine Klemm's operation. Hourly flying costs much lower than those of the average training or sport plane mark this most modern of all light airplanes as the predominant buy for those who are mindful of flying expenses.

Here, for instance, is a typical example of Aeromarine Klemm's day-in-and-day-out economy. Plane number 9177, used as a training plane by the Airview Flying Service at Red Bank, New Jersey, cost $3.20 per flying hour, based on all expenditures from August 25th, 1929, to March 29th, 1930. Hourly cost was computed as follows: 987 gallons of gasoline at 30c., $296.10; 18 gallons of oil at $1.60, $28.80; service, repairs and cleaning at $1.50 per hour, $334.50; replacement parts, $52.84. Total, $712.25 . . . divided by 222 flying hours, equals $3.20 per hour. That's *real* economy for you.

A group of nine students soloed in this same plane in an average of 4½ hours each!

For primary training the AKL-25, powered by the Salmson 40 h.p. engine, sells for $3350, flyaway, Keyport, N. J. For secondary training and for cross-country work, the AKL-60, powered by the LeBlond 70 h.p. engine, sells for $3500, flyaway, Keyport, N. J. Equipped with pontoons and powered by the LeBlond engine, the AKL-60 sells for $4500, flyaway, Keyport, N. J.

Dealers and distribuitors are invited to investigate our profitable franchise and territorial assignments. Write for complete data and information on our sales plan.



AEROMARINE KLEMM CORPORATION

GENERAL MOTORS BUILDING 1775 BROADWAY NEW YORK CITY

Announcing —

New Quick-Attachable Parachute *by* TRIANGLE



HERE it is, tried and proven, the finest quick-attachable pack yet developed. Designed by Hoffman, recognized world authority on parachutes, to fill the need of gunners, photographers, and observers on lighter-than-air craft who cannot conveniently wear a chute at all times, it offers a new standard of air safety.

The flyer wears the harness. The chute, all packed, is attached to frame of cockpit or cabin. To attach pack to harness simply insert fitting on pack into lock on harness and give pack a quarter turn. *Entire operation takes less than two seconds!* You see it lock, hear it lock and feel it lock! Pack remains in place when chute is opening. No danger of jumper getting struck in head with heavy pack or metal parts.



This most efficient of parachutes allows aviators to use the new Hoffman "Monkey-Tail" belt shown in Photograph (1) above. (Strength, over 2,000 lbs.) It gives the flyer complete freedom of motion but anchors him securely to floor of ship.

Photo (1) shows Triangle "Monkey - Tail" Belt and the front of harness for quick-attachable pack.

Photo (2) shows side view of pack attached to harness. Notice sturdy metal fitting. It is made of stainless, non-magnetic steel. It has been successfully drop-tested with 1000 pounds of lead.

Photo (3) shows pack attached to harness. Pilot's hand is on rip cord.



Note These Features of the Hoffman Triangle Parachute

1. **Certainty of opening**
2. **Rapid opening**
3. **Low shock on opening**
4. **Steerability**
5. **No oscillation**
6. **Slow rate of descent**
7. **Comfort to wearer**

Is $75.00 a year for five years too much to pay for security—and possibly your life?

E. H. Hoffman

New Easy Purchase Plan

An easy and simple deferred payment and rental plan is now available. Write for complete details.

The TRIANGLE PARACHUTE Co.
Globe-Wernicke Building
CINCINNATI . . . . . OHIO

(*Continued from preceding page*)

GOOD old Uncle Tony Fokker—God bless his chubby old soul!—has spent much of the last six years coming to my assistance. Time and again he has helped me out and never charged me a cent. Many's the time I have sat at this confounded portable, wondering what there was to write about—and there was nothing.

Then, out of a clear sky, would come help from the good Dutch uncle. He would say something, or do something, or have his picture taken so I could write about it. Only just now I was stuck for one more item to shove in here, and wondering where I would get it, when up went the good Tony and provided it.

You know, Anthony H. G. Fokker was the third pilot in the world to have a pilot's license. This was F.A.I. License Number 3, issued in 1912. The plane he was flying at that time was his first, built entirely by himself, and in which he won the St. Petersburg Trophy. Incidentally, he has outlasted the City of St. Petersburg. He's still Tony Fokker but that town went off the map and caem back as Leningrad—or grab.

Well, Uncle Tony's such an old-timer that he hasn't bothered taking out a Department of Commerce license. But on the second of July when he was at Roosevelt Field watching Major Kingsford-Smith take off for California, he felt so good about the wonderful flights that old Fokker plane had made that he simply had to get up in the air and work off steam. So off he went in a Monocoupe, which is such a snappy and frisky little plane to fly that it made Uncle Tony feel even better. Oddly enough, the Monocoupe somewhat resembles Uncle Tony in appearance, or resembles him as much as an airplane *can* resemble a pilot. It's a sort of chubby, good-natured, quick-moving little plane, full of pep and good feeling. So Tony and the Monocoupe made a pretty snappy pair.

Well, away these two went—a kind of frisky, chubby edition of "We." There was a passenger aboard, too, which made it "We, Us & Co." or something like that. She was Miss Luba Phillips, a Russian pilot, the first woman whom Uncle Tony had taught to fly, and the owner of the Monocoupe. But she doesn't really count in the story, for all she did was just to sit there while the sportive Uncle Tony proceeded to show that Monocoupe what a real old-timer thought of it. He pulled it off the ground after a short run, did a series of chandelle turns at low altitudes, and then flew along the eaves of the hangars, smiling amiably at the startled spectators gathered around. He quite astonished the assembled multitude with his prowess at the controls, and stirred up a great amount of pleasant excitement in all those present—with one unfortunate exception.

Right here is where tragedy stalks into the drama in the person of that one unfortunate exception—Chief Inspector Samuel L. Willetts of the Department of Commerce. Chief Inspector Willetts was conscious of some excitement but of absolutely no pleasure. He watched with a cold and unsympathetic eye the merry maneuverings of the playful Uncle Tony, the while he summed up the various regulations that were being tossed so gleefully and carelessly about.

Meanwhile, quite unconscious that there was "thunder on the left," the bold Tony landed and took off a couple of times, unaware that the avenging chief inspector had started toward him each time to drag him before the bar of justice. After his final landing he was in the middle of a sentence in enthusiastic praise of the little plane when the Hand of the Law descended upon him.

What he might have said further, unfortunately, is lost

(*Continued on following page*)

DALLAS AVIATION SCHOOL • DALLAS • TEXAS

Why Pay More For Your Flying Training?

Transport Course — $2500

The full course of 200 air hours with complete ground school. Qualifies for Transport License.

Commercial Course — $795

Fifty hours of training in the air, with full ground school course in classrooms and shops.

Private Pilot's Course $385

Twenty air hours and the complete ground course.

WE WILL PAY YOUR RAILROAD FARE TO DALLAS

from your home, whether you come by train or auto, if you enroll for the Transport or Commercial Course—one-half your fare if you take the Private Pilot's Course.

Fifty-two graduates finished their training at Dallas Aviation School and received their Department of Commerce Licenses during May and June. This school is operating at full strength and giving its students training that is unsurpassed in America.

*

Dallas Aviation School is nationally known as the largest flying school in the South, located where flying conditions are ideal the year 'round, and where students complete their training quicker and at less cost. Our graduates hold many of the best flying positions in America.

*

This school is best for you right now because training at Dallas continues through the mild fall and winter, without costly interruptions on account of cold or stormy weather. Every week you are delayed at flying school means not only another week's expense, but another week lost from gainful employment as a graduate pilot.



Class graduating May 28. Each received his pilot's license after passing the flying tests and written examinations of the U. S. Department of Commerce.

*

Our fleet of training ships includes the following types: Stinson, Ryan, Fleet, Eaglerock, Commandaire, Mono Coupe. Your training in this wide range of types qualifies you to fly any ship you may be called upon to use in the course of your flying career.

*

Love Field is one of the largest and best known airports in America — a travel and transport center for a large number of lines. It is an ideal place for training and for making valuable contacts and observations. The field is located about 6 miles from the heart of Dallas —a city of nearly 300,000 people.

*

Board and room are provided for the students at the Field, with all city conveniences, at a cost of about $10.00 per week.

*

This school uses only the best equipment, perfectly conditioned and rigidly inspected. Our record of safety and successful training is among the best in America; our students become *real* flyers.

*

The above prices represent the very minimum at which the right kind of flying training can be secured in America. All prices are soon to be increased — arrange for your enrollment now.

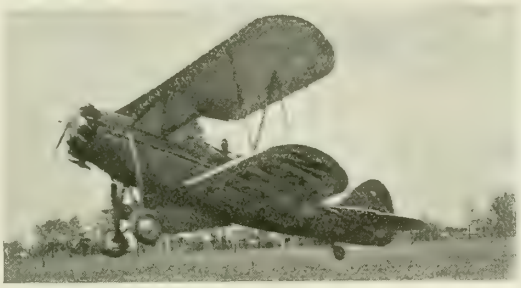
An interesting booklet upon the school and its courses, containing full details, is yours for the asking. Write for it today.

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DALLAS AVIATION SCHOOL

Love Field **DALLAS** *Texas*

Years ahead in *design and performance*



THE great new WACO "Model F" is far ahead of all contemporary aircraft in design and performance. Its superiority is so obvious that it is selling on demonstration everywhere it is shown. It challenges comparison on any score.

The WACO policy of conservative production has been impressively substantiated during the current season. For WACO never has built in advance of actual orders. The result was that no surplus of 1929 airplanes was carried over by WACO into the present season. Thus, WACO could and did proceed untrammeled with production of the new Model F, which incorporates refinements of design and characteristics of performance that make it an unmatched value, by any standard of comparison. The natural consequence is that registration figures for this year are showing an even larger percentage of WACOs than in the past.*

With ability to climb better than 1000 ft. in the first minute (16,000 ft. in a half hour) . . . and to land phenomenally short (less than 100 ft.) . . . the WACO Model F with Kinner B-5 (125 h.p.) engine is priced at only $1,285, completely equipped, flyaway. With the Kinner K-5 (100 h.p.) it is priced at $1,100 and with the Warner Scarab (110 h.p.) at $1,250.

May we send you complete details?

THE WACO AIRCRAFT CO., Troy, Ohio

WACO AIRPLANES

"ASK ANY PILOT"

*WACO dealers naturally are benefiting.



The new WACO Glider likewise is acknowleged to set the standard of comparison, in *design* and *performance* and *value*. It is priced at only $385, boxed for shipment. Send for details, with suggestions for Glider Club formation.

(*Continued from preceding page*)

to posterity, for his time was fully occupied in learning that he had broken various regulations, including flying a licensed plane without a license, and reckless and spectacular flying generally. Completely cooled off under this shower of sad information, the chastened Uncle Tony trotted off to Mitchel Field, took a physical examination from Major Moulton, and received a letter of authority to fly under student regulations, pending his passing of flight tests. After that there will be a little swap—the Department of Commerce will swap a pilot's license for Uncle Tony's check for $500.

The older and better known, and especially the famous pilots and designers, owe it to the industry in which they have been successful *never* to fly recklessly or to endanger their lives. As their fame is greater, so their responsibility is greater. If some unknown pilot kills himself the public is not unduly disturbed. But if some famous pilot foolishly bumps himself off, Mr. and Mrs. Public will say, "There! Flying is so dangerous that even famous pilots get killed. Don't tell me my boy should go into aviation!"

IT has long been recognized and complained about in many quarters that the National Air Races almost invariably have been lacking in that air of solemn dignity and aplomb so much desired by the oldest and most respectable inhabitants. In a worthy and laudable effort to inject an air of Chesterfieldian grace into these 1930 proceedings, Major R. W. Schroeder, contest chairman, has written me a letter in which he says: "Please consider this an official invitation to you to lend dignity to the scene by your presence as a member of the Contest Committee. If you will be kind enough to accept the position of Judge, will you please advise us immediately."

Well, I wrote and told the Major that if it was dignity he wanted that he had come to the right shop. I'm perfectly willing to lend dignity to the scene, so long as I get it back, because I'm short of it. Dignity is about the only thing a man can lend and have it returned.

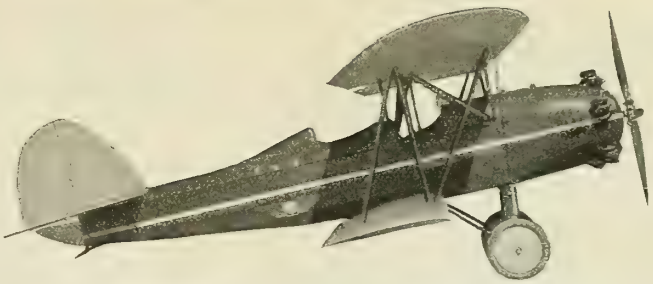
So I'm to be a Judge—for the duration of the races, August 23rd to September 1st. If I follow the standard procedure of some of our New York judges, I should be indicted by the Grand Jury on September 2nd.

Speaking on behalf of the Contest Committee, which at this writing consists of Shorty Schroeder, contest chairman; Frank McKay, assistant; Ray Collins, chief starter; Pop Cleveland, operations officer; Carl Egge, secretary, with Roger Williams and myself as a couple of dignified judges—and a few more of equal dignity yet to be selected, as soon as they get their dignity out of moth balls—I want to assure you six readers that the boys are going to get a break this year at Chicago. If you don't, sue me.

All you pilots, when you land at Chicago, if you're not handed everything you need, see Carl Egge, and you'll be fixed up for the duration of the races, so you won't have to plead with policemen or pay taxi bills or buy admission tickets in order to get to your plane—which has been the usual and standard custom at earlier races. It's just dawned on the Powers that it really is the Pilots who put on the Show—I think Shorty Schroeder played the part of Dawn in that production, or it may have been Cliff Henderson. Anyhow, the Better Day has Dawned, and you're going to get a break at Chicago.

And say—how about no drinking among pilots for the duration of the races? What do you say if we startle the public by all staying sober, not only contestants but *all* pilots? Just a suggestion. But I've casually climbed aboard the wagon myself—and I don't want to be too lonesome.

Who Said, "Buyers' Strike?"



3-Place KINNER "BIRD", Complete, $3895

FIFTY-FIVE Brunner-Winkle "Bird" planes were sold during the four and one-half months, March to July 15, inclusive. ¶ Buyers are wiring and phoning their orders and many are coming personally to the factory for ships. Airplanes with real performance can be sold if prices are right. ¶ Fly an OX or Kinner powered "Bird" plane and you will know why there is no buyers' strike as far as "Bird" planes are concerned. ¶ Name the ship . . . with the same horsepower . . . that can compare with the "Bird" in performance, stability, construction and appearance. ¶ Let real value be your guide in the purchase of an airplane.



3-Place OX-5 "BIRD", Complete, $2495

DEALERS: *We have a very attractive and profitable sales proposition to offer—factory co-operation, etc. Write for full details.*

"ASK THE PILOT WHO FLIES ONE"

BIRD

BRUNNER-WINKLE AIRCRAFT CORP.

1-17 Haverkamp Street

Glendale, Long Island, New York

Faultless Vision

with all day flying comfort



THE WILLSON PILOT GOGGLE

THE wind that forces its way under the padding of ordinary goggles and gives the flier "crying eyes" cannot penetrate the sealed air-tight contact which this channel-shaped, pliable rubber mask creates. Only slight headband tension is required to give this sealed contact, and thus the wearer is relieved from discomfort and any tendency toward sinus trouble caused by undue pressure on sensitive parts of the face from excessive headband tension.

While flying, air is forced through the venturi tube (on top of each cup) which partially exhausts the cup interior and so eliminates lens fogging.

Each lens affords a lateral range of vision of 135° and their surfaces are ground with a precision that permits of no image distortion. This frees the flier from those headaches which usually come from eye-strain during prolonged periods of goggle wearing.

The workmanship, appearance, and performance of the Willson Pilot Goggle leave little to be desired.

PRICE

with clear glass $20.00 per pair
with tinted glass 23.00 per pair

WILLSON PRODUCTS, Inc.

READING, PENNSYLVANIA
U. S. A.

AVOIDING THE CROWD

(*Continued from page* 49)

Charles Augustus is going to miss a lot of fun which the small and middle-sized boys of today are thoroughly enjoying. His daddy's trade will have become as ordinary and unexciting as the life of a street-car conductor.

But the forecasters and feature writers, as usual, have failed to figure the future except in the terms of the present. They are talking of crowds and the crush of traffic, principally because today is crowd-crazy and getting worse. It doesn't seem to have occurred to any of them that the present may be a bad dream, from which the world will someday wake up with better sense. And they all missed a chance to show how aviation might contribute to such a desirable prospect.

It is a matter of record that people once knew how to mind their own business, and to live in comparative quiet, decency and privacy. That was way back, when there was nowhere to go and no way to get there. Folks lived and died in their little town or village, and never suspected that the New York subway at the rush hour would someday make the sardines in a full can seem positively lonely.

Probably they would have considered the cities of today as monstrous nightmares. They would have considered it indecent to live like ants in a heap, to work in great barracks, to spend most of our time avoiding our neighbors' elbows, bunions and halitosis. And very likely they would have been right.

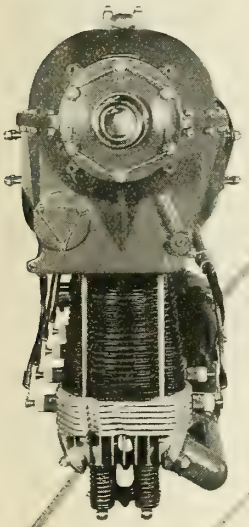
But when it was discovered that steam would do something besides make the kettle sing, the tide of the times began to set toward the cities and the work and play of the world created the crowd. The home workshop gave way to the factory and the factories clustered at the terminals of transportation, and all the workers came to live as close as they could to the day's work and the pay envelope. The cities grew big and ugly and broke out with all sorts of social diseases. There's no period in industrial history so sad and drab as the early age of steam, when the factories first raised their smoking snouts and the iron rails laid all the habits of men in bondage.

But civilization is always stirring to get out of one mess into another, and delivered itself just in time from slavery to steam and steel. The tide toward the cities was halted and within this generation has gone away again toward the blue sky and open fields. The census figures of this year of grace tell the story for those who will read them carefully and with understanding. The big cities claim to have grown bigger—though why they should want to be any bigger is beyond all sensible comprehension—but the ones that have done so have increased their populations principally by extending their boundaries. Many lesser cities have stood still or even gone backward. Towns have grown larger; cross roads villages have vanished or shrunk to nothing in particular. Everywhere the suburbs have grown mightily and spread far and wide around the city workshops.

Electricity and gasoline have done this thing. They have made transportation flexible and the transmission of power an easy matter. It is no longer necessary for a man to live within sight and smell of his own factory or office, nor even within range of the railroad tracks. He can live comfortably and conveniently nearly anywhere he pleases, linked to the rest of the world by electric wires, telephone cables, gas pipes and a network of smooth highways. Even the waves of ether contribute to his new freedom from the plague spots of crowded cities.

(*Continued on following page*)

The MENASCO PIRATE AIRCRAFT ENGINE





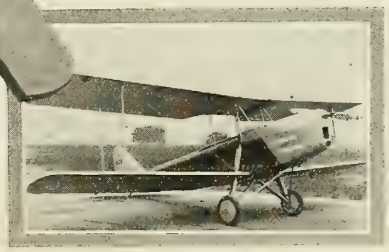
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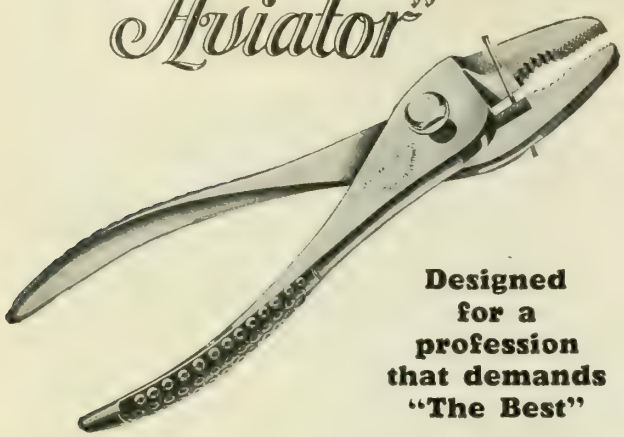
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Designed for a profession that demands "The Best"

No branch of human endeavor is so exacting in its requirements as flying. From the men who build and pilot planes, right down to the smallest tool and accessory employed in airplane manufacture, the cry is for "The Best."

IN recognition of the principle outlined above, we have put into *The Aviator* the best in design, workmanship and material that human skill and experience can produce.

Carefully studied design has given these pliers enormous overcapacity, both as to gripping and cutting power—at the same time permitting *an appreciable reduction of weight over ordinary pliers of the same length!* Lightness without sacrifice of strength—ideal for plane equipment.

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(*Continued from preceding page*)

The cities are better for this change in the custom of civilization. Every great city in America is losing population at its center and replacing it with public buildings of dignity and beauty, with open parks, and with great office buildings which are busy as beehives by day and deserted at night. The improvement has still a long way to go, but it is undoubtedly on its way. And it is fast and flexible transportation which is working the miracle.

One of the uncalculated opportunities for the airplane lies in this instinctive exodus from the cities. Subject to some temporary difficulties in regard to airports and other necessities for getting safely up and down, there is no more flexible means of conveyance than the plane. It is tied to neither road nor track, and it can go anywhere where there is air, which is practically everywhere. It already makes the millionaire's home on the upper Hudson as near to his office as the far end of Riverside Drive. It goes as easily to the secluded sanctuary in the woods or mountains as to a nearby city. It hops over hills and waterways and never needs a detour for anything less than a fog or thunderstorm. It makes one place exactly as good as another, if its owner has the price and a place to put it down.

It is too soon to be talking confidently of these things, but the airplane promises to affect the course of civilization more by its flexibility than by its speed. If it ever comes into general use—not, of course, in its present form, but as a cheaper and much more manageable critter than it is now—it will change still further the character of cities and spread still further the limits of the so-called suburbs.

The high cost of planes, pilots and repairs still stands rather formidably in the way of such a prospect. But these figures will inevitably come down, either by an accumulation of economies or by some sudden discovery of an inventor yet unknown, or else the public appetite will rise to the occasion. It is clear that both happened to the automobile. The best cars of today cost about the same as the poor ones of yesterday. Nor does the average man worry much about the high cost of owning and driving a car, when he figures the good he gets from it.

There are signs that this country is on the right track in bringing the costs of aviation distantly within reach of the public demand. I note that Henry Bouche, editor of the Paris *Aeronautique,* has presented some figures to the first international conference of aviation experts conducted by the League of Nations. I suppose he knows what he is talking about and that he is correctly reported. He says that the British taxpayers contribute $6 a mile to the support of the empire airways and $1.28 a mile for those which link London with the capitals of Europe. The French airlines cost the nation $1.09 a mile, and the German need a subsidy of ninety cents a mile. The Italians do a little better with a deficit of seventy-seven cents a mile.

He estimates that the public pays for American aviation at the rate of seventy cents a mile. I don't know how he figured it, but part of it is the air mail deficit and some of it may be the losses of operators and investors. In any case it looks as though this country has done a better job of economical operation than the rest of the world, principally because it had no choice in the matter. There's nothing like necessity as an argument and encouragement for reducing the high cost of living.

The French statistician also gives us credit for a record in safe operation, reckoning our planes as eight times as safe as those of his own country. He says that half the world's airports are in this country and that American planes carried in 1929 a quarter of all the air passengers of the world. Finally he points out that within two years

(*Continued on following page*)

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I removed all corners, all flaps, all rubbers, all folded springs from the Pack. No other parachute of like size is so small, so snug, so trim, so light, so free from objections as to bulk or "catching on things" when being worn.

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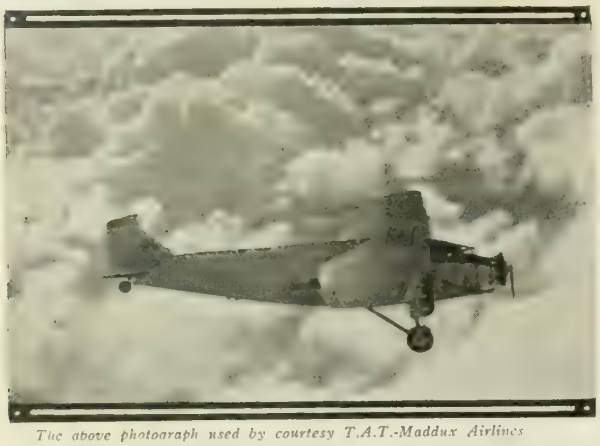
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(Illustrated)
AIRPLANE HORN

For all Outdoor use. This horn has been perfected after years of exhaustive research in Racon Laboratories. Will withstand all weather conditions. No time limit to guarantee. Made to last forever. Requires no replacements or servicing after heavy rainstorms. . . . Prices slightly higher than regular horns.

THE use of radio in aircraft operation is made doubly valuable with the new Racon amplifier. Air transport companies will find it of inestimable value in the safe delivery of passenger and express cargoes during bad weather. During recent tests in Chicago, in a snow storm, the voice was distinctly audible more than a mile away. No pilot or operator can fail to realize the import of establishing communication between the plane and the ground crew preparatory to landing when visibility is so poor that a safe 'set-down' is nothing more than a matter of a good guess and plenty of luck.

FOR AERIAL ADVERTISING

Through the Racon Airplane Speaker the broadcaster's voice can be heard for miles. Even though the plane may be hidden in the clouds, the voice—or music—can be heard above the din of city traffic. During the Chicago tests music was broadcast from a phonograph record and was heard very clearly several miles away.



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Baby Electro Dynamic Horn unit capable of handling undistorted output of 15 watts.

The Racon Airplane Speaker was designed for airplane or airport use. It is very light and compact and was built to withstand rapid changes in air pressure. Instead of the usual dynamic unit, the Racon horn is equipped with four apertures utilizing four Racon Giant dynamic units. Consequently the Racon horn has four times the ordinary volume.



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Slough Bucks, England

(*Continued from preceding page*)

our passenger totals have increased fourteen times and our air mileage has quadrupled, while our nearest competitor, Germany, made less than a fifty per cent increase.

Decreasing costs and increasing business go hand in hand, and it is not easy to decide which is responsible for the other. It is also certain that cost is a minor consideration in return for the right sort of service or convenience. Only two major airlines—again according to M. Bouche—are paying a profit without outside aid in all the world. These are the German Scadta in Columbia and the Junkers company in Persia, which are both prosperous because they offer a service which cannot be duplicated by any other transportation means and is badly needed. The public will pay the price to get what it wants.

Right now it wants to get away from the steaming, suffering city to fresh air and green pastures. Now that there are planes for all purposes and airports in diverse places, business should be picking up for the airplane salesman. He is not likely to be rushed to death for some years to come, but the industry's best prospect at present is the private owner, who can afford an airplane and has somewhere to go in it.

LIGHT-HEARTED AND LIGHT-HEADED

(*Continued from page* 48)

have two bags of sand left. The bottom of the balloon is like a soggy wash-cloth. It's starting to parachute, which helps slow us down. Whoa! We've stopped going down. Now we're going back up! Ah, there you are! To the northeast a mile ahead is a mean-looking squall, that same baby we heard barking at us upstairs! Sucking us right up into her middle, and noisy and spitting fire. The last time Eric let one of those things get his balloon it gave him an express ride up to 27,500 feet on the barograph. It wasn't 'till later he could read the figures, because he went out cold himself at 26,000 feet. No thank you, Mister Squall! We crack our gas valve for the first time since taking off. But the squall is insistent. It's still pulling us up! We hang on to the valve rope. That's better! We're dropping again. Fast now. Over the side goes a bag of sand. What's ahead? The foothills of the Ozarks! There's a clearing! We'll set her down there. Cut the drag-rope!

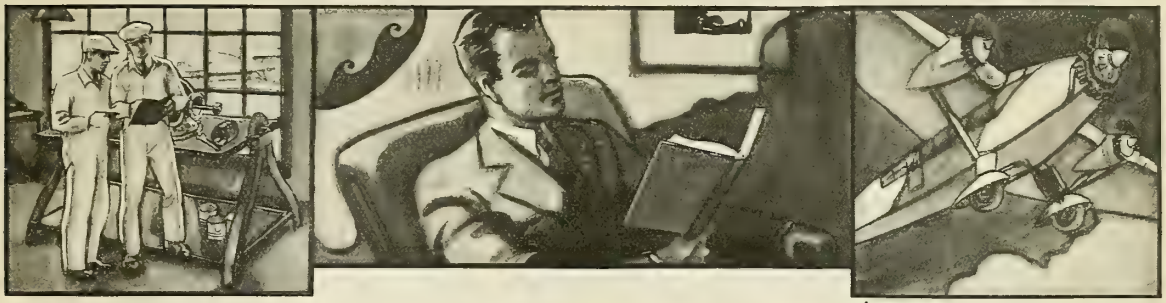
3:35 p.m.—We are down with a rip-panel landing between Athens and Umpire, Arkansas—just two more good guys who tried hard. (21 hours, 20 minutes, 335 miles).

EVERY balloon flight must have its epilogue. Half an hour after we were down, punch-drunk, but busy packing, a hill-billy quartet hove into view. I asked about transportation to take our equipment to a railroad station more than twenty miles away. The spokesman said "Pappy" had a truck. I asked to be driven to "Pappy." At length we arrived at the kind of a shack one might expect. I was like the British soldier in Gunga Din—dying for a drink, even water. There was a well on the place. They drew me a keg of clayish water. "I'll git you a dipper" said the native. He vanished in the house and brought me one. I drank deep. Then I asked for "Pappy." He came out, perturbed. I asked for transportation. "Sorry, stranger," he said, "but I got sick folks in the house. Three of 'em got typhoid, and they're all a-feverin' right smart. Give me that dipper. They're cravin' water inside."

They say men who lead hard lives generally recover from typhoid. So I'll see you later.

The WILLCOX Practical and Dependable AVIATION BOOKS

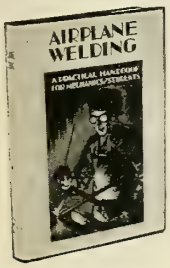
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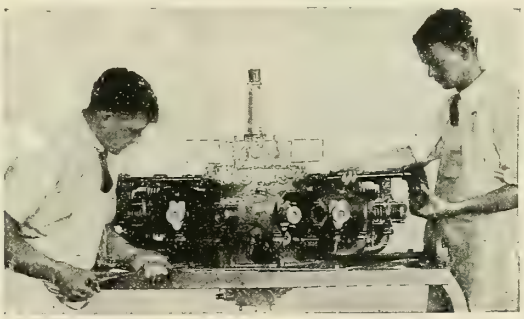
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AIR-HOT AND OTHERWISE

(*Continued from page* 55)

man who makes the wrong plans carefully and carries them out with skillful accuracy can go into bankruptcy with lightning speed and land very deeply therein.

Proclaiming aviation as a stunt or even publicising any but its useful functions helps to shunt the public mind to the wrong viewpoint. Aviation was a stunt in war-time. But aviation is a business in peace-time, and a very serious business with no room in it for stunts. There is greater difference between commercial aviation and an air circus than there is between the Supreme Court and Sells Brothers' Show. Too much imagination of the wrong sort and not enough concentration of the right sort—such procedure, for example, as will lead to building without consideration of costs. Many a manufacturer has built without knowing what his costs would be before he started, or what they really had been after he had finished. In more than one big organization such details have been everybody's task and therefore nobody's REAL business. The impulse to spend, spend, spend has been mistaken now and then for genius. It gets results, but WHAT results! We have had morons in high places in the industry who have chanted smilingly to themselves that jolly old tune, "The Public Will Pay." But the melody has been about as appropriate as that dear ballad "Home Sweet Home" is to divorce litigants. The public will NOT pay except for service rendered.

Gentlemen of the aircraft industry, you cannot organize your industry, as you positively must, without reorganization of your units, which supposedly are working for the general good, but really sometimes are flying blind without any instruments.

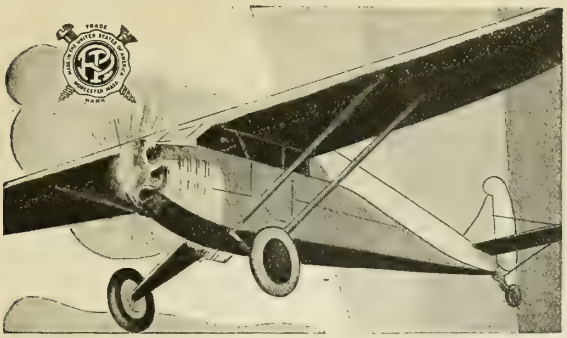
Team work. Among other things, cut down the overhead of your Aeronautical Chamber of Commerce. It cost $170,000 last year, a large sum in these times. Keep in mind that with every merger a dozen or more active memberships are combined under one head and with only one membership due to be paid. This cuts the revenue, and we may never have another $170,000 a year to spend.

The Aeronautical Chamber of Commerce needs reorganization as definitely as the N.A.A. needs it. And that is going some. When individual sick men are in a similar condition and the honest doctor comes, he either operates or shakes his head and goes away, tipping off his best friend among the undertakers as to where a corpse will soon need ice. Sham teamwork is sometimes a crook's device, oftener a fool's mistake.

The American industry is not dying. It is only in a state of coma. Sometimes, in similar instances, doctors have been called and have taken highly scientific measures; sometimes Fate has been the doctor and has administered a fierce, swift kick. Sometimes the industry builds for its customers right good planes equipped with all the very latest scientific dofunnies, but it, itself, seems at the moment to be flying helplessly in an impenetrable fog, eyes bandaged and one wrist sprained.

It will snap out of this bemused condition before the cops find it, ring for the wogan and ship it to the hoosegow or the crazy house, but the sooner it wakes up the better. We have too many sleeping beauties in our general cockpit, gentlemen. Every man we slap upon the wrist (or elsewhere) and arouse will be one more man awake. We

(*Continued on following page*)



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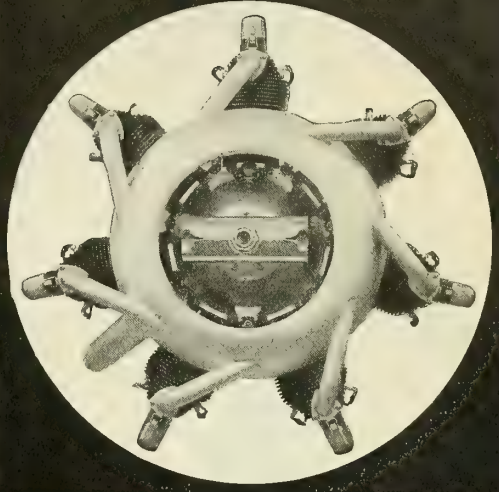
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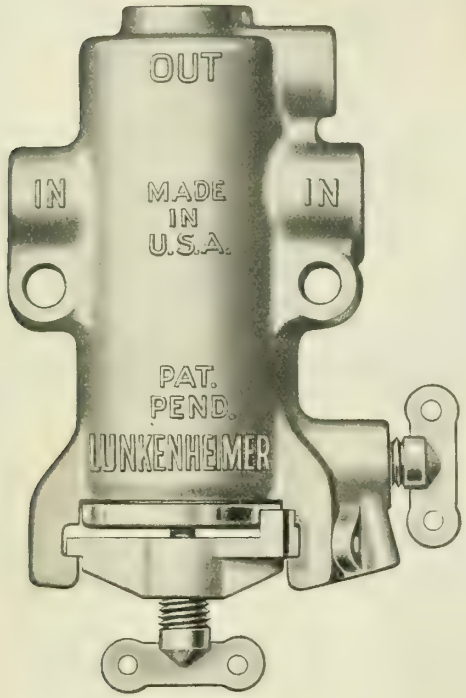


Fig. 1239
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(*Continued from preceding page*)

have an internal condition which demands quick sanitation. Get the insect powder for the phoney publicity men and sift them generously till they are on their backs, legs in the air, with mouths and typewriters forever stilled from bragging about stunts.

Promises not kept create distrust; distrust means ruin.

Stop circusing your product and begin to merchandise it. Learn what the public, the Government and the commercial operators want, and give it to them. They will pay for it. Don't think damfoolishness is great because it appears to be original. Find experts, or make them, and then keep them on the job of building to sane specifications of real orders.

A few manufacturers have done this and are on the way to real success. Get your house in order before you ask the neighbors in. Talk less and perform more. Help others and you'll get their help—and if you don't, you won't.

It's a big industry. One manufacturer never will be able to do all the business. Every good job put upon the market by the other fellow will help you get big jobs if you're as good as he is.

Summing up. It's easy to knock but hard to build.

If these few words of knocking can induce some greater intellect than mine to devise ways and means for cleaning up the situation till all knocks shall be unjustified, and it would not be so great a job, we all may well be satisfied.

We've got to hustle, gentlemen, but we know how; and hustling will bring everything we want. Let's want as much as possible and then GO GET IT THROUGH TEAM-WORK AND COMMONSENSE.

AVIATION IN THE SOUTHWEST

(*Continued from page* 58)

direct air travel from Los Angeles to Portland and Seattle and to Denver and El Paso. Finally, W.A.E. operates an amphibion line from Los Angeles to Catalina, using Loenings. This route, formerly operated by Pacific Marine Airways, was taken over in January, 1928.

The company's growth in operations for the year 1929 may be best illustrated by comparing the 2,530 miles flown daily at the beginning of 1929, with the more than 8,000 miles flown daily at the end of the year. Altogether airplanes operated by the company flew 2,264,538 miles during the year 1929.

The report on patronage of the line since it began carrying passengers is indicative of the rapidly increasing popu-

(*Continued on following page*)

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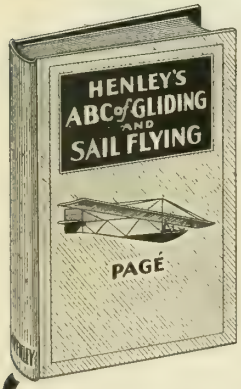
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(*Continued from preceding page*)

larity of air travel. In 1926 W.A.E. hauled 267 passengers; in 1927 the total was 408, and in 1928 the number increased to 6,794. Last year the total exceeded 25,000, an increase of nearly 400 per cent. The company's full report on its operations since it began service in April, 1926, show its airplanes have flown more than 4,300,000 miles and have carried more than 32,000 passengers.

Besides building its own airport at Los Angeles, the company has established landing fields at Las Vegas, Kingman, Holbrook and Albuquerque and aided in improving airport facilities at Salt Lake City, Denver, Kansas City, Wichita, Amarillo and Agua Caliente.

Recently Aero Corporation of California was merged with Western Air Express. This union of interests makes W.A.E. one of the largest commercial air transportation companies in the world in point of plane-miles scheduled daily. With the addition of Standard Airlines, passenger operating subsidiary of Aero Corporation of California, and with several changes in the route operated, the plane-miles of the system have been increased to more than 16,000 daily.

W.A.E. has also announced the extension of airlines in the Southwest covering 2,000 miles of territory in Colorado, Texas and Oklahoma. New lines from Amarillo to Wichita Falls and Dallas, Texas, and Amarillo and Oklahoma City and Tulsa, Oklahoma, were inaugurated on April 9, 1930. On the same date Mid-Continent Air Express, also a W.A.E. subsidiary, opened a new line from Pueblo, Colorado, to Amarillo.

Mid-Continent Air Express, Inc.

Mid-Continent Air Express, Inc., is one of the most recent lines of W.A.E. to begin operations. It carries passengers and express between Pueblo, Colorado, and El Paso, Texas. Intermediate stops are made at Las Vegas, Santa Fe and Albuquerque.

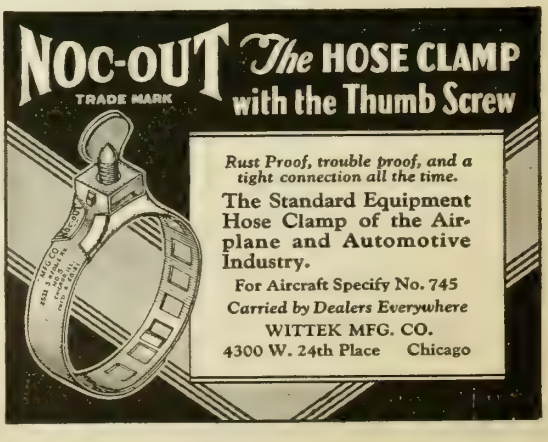
Connections are made at Pueblo with the Cheyenne-Pueblo division of Western Air Express for continued air passage to Cheyenne, where reservations on the Chicago-San Francisco division of Boeing System are available. Other air connections both to the East and West can be made at Albuquerque on either T.A.T.-Maddux or Western Air Express.

The company operates six-passenger cabin planes on its lines, and does charter work as well. It also operates passenger lines from Pueblo to Amarillo.

Standard Airlines, Inc.

Standard Airlines, Inc., the operating unit of the Aero

(*Continued on following page*)



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(*Continued from preceding page*)

Corporation of California, recently merged with Western Air Express, formerly operated daily between Los Angeles and El Paso. When the line was taken over by W.A.E., the route was changed to serve San Diego and El Centro, thence to Yuma, Phoenix, Tucson and Douglas in Arizona with El Paso, as before, the eastern terminus. On May 5, this line, which is division No. 6 of W.A.E., was extended to Dallas, with stops at Midland, Abilene and Fort Worth. Train connections can be made at El Paso for eastbound traffic with a change to the S.A.F.E. at Sweetwater, which provides air service to St. Louis. Connections may be made at St. Louis for flight to Chicago via Universal Air Lines, or direct railroad connections may be made to New York.

The company operates fourteen-passenger multi-motored cabin planes. In addition to scheduled flights, it does considerable charter flying in Arizona.

A branch airline was recently added from Douglas to Nacozari, Mexico, at the instigation of mining officials and public officials. This forty-minute air trip supplants a ground journey requiring four hours. Planes are landed at Purice, seven miles north of Nacozari.

Southwest Air Fast Express

Southwest Air Fast Express, Inc., was organized several years ago at Tulsa, Oklahoma, by Erle P. and J. C. Halliburton. The company operates lines between St. Louis and Tulsa by way of Springfield, Missouri; between Tulsa and Kansas City through Coffeyville, Kansas; from Tulsa to Dallas by way of Oklahoma City and Fort Worth; Tulsa to Sweetwater, Texas, through Oklahoma City and Wichita Falls, Texas.

S.A.F.E. is an independent organization, but its schedules are timed to provide good train connections and junctions with other airlines where possible. Equipment consists of fourteen-passenger trimotored Fords which are used on scheduled trips, and Wasp-powered Lockheeds for charter trips and "hops" over cities where the company uses airports.

The westbound line terminating at Sweetwater makes connections with the Texas & Pacific Railway from which the passenger can transfer to the Standard Airlines (W.A.E.) at El Paso. Railway and airline connections are also made at Kansas City and St. Louis for Minneapolis, Chicago and New York.

S.A.F.E. took the initiative in cutting mileage rates, having established a record low rate of 4.6 cents per mile on its Fort Worth-Tulsa-Kansas City route. The company has been carrying capacity loads for some time.

(*Continued on following page*)



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(Continued from preceding page)

T.A.T.-Maddux Air Lines

T.A.T.-Maddux operates a fast cross-continent passenger service, which was inaugurated in July 1929. The combined air-rail service is operated in coöperation with the Pennsylvania Railroad, and the Santa Fe lines. The Pennsylvania carries the passengers from New York to Columbus. T.A.T. then flies them to Waynoka, Oklahoma, where they embark on the Santa Fe train, which arrives at Clovis, New Mexico, early the next morning, whence the passengers take off again in a T.A.T. plane for Los Angeles.

Airports in the Southwest used by the T.A.T. are located at Waynoka, Oklahoma; Clovis, New Mexico; Albuquerque, New Mexico; Winslow and Kingman, Arizona; Barstow and Los Angeles, California.

The company uses ten-passenger trimotored Fords, and is controlled in part by the Pennsylvania Railroad. The company recently merged with Maddux Air Lines, Inc. The new T.A.T.-Maddux line operates twenty-three trimotored transports and three Curtiss Condors.

Apache Airlines, Inc.

Operations are carried on by Apache Airlines between Phoenix and Globe-Miami. Equipment consists of trimotored Kruetzer air coaches. Two round trips are made daily carrying air express and passengers. Midland airport is used at Globe-Miami, and Scenic Airways' Sky Harbor is the Phoenix terminal.

Union Airways, Inc.

Union Airways is the result of a merger of several Arizona companies, among them the Southwest Air Service, Scenic Airways, and the Aero Corporation of Arizona, which was engineered by Lieut. Leslie Arnold, Army 'round-the-world flier. The company will operate a north-south line which will connect with T.A.T.-Maddux on the north and Standard Airlines division of W.A.E. on the south. Important ports of call are to be Winslow, Phoenix, Prescott, Tucson and Douglas.

Scenic Airways have not operated regular passenger schedules in the past but instead have specialized in sightseeing service. The line is best known for its flights over the Grand Canyon of the Colorado. Operations are carried on from the south rim of the canyon, with home port at the company's private airport, Sky Harbor, at the state capital, Phoenix.

"Scenic" trips are also handled from the company's eastern terminus, El Paso, to Carlsbad Caverns in New Mexico.

Just recently the company established a state border to

(Continued on following page)



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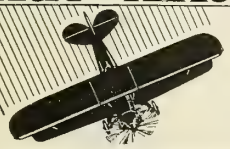
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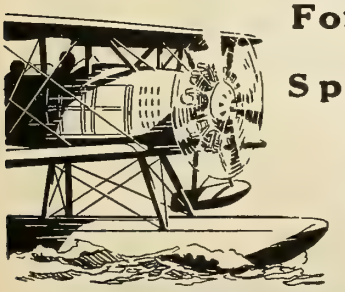
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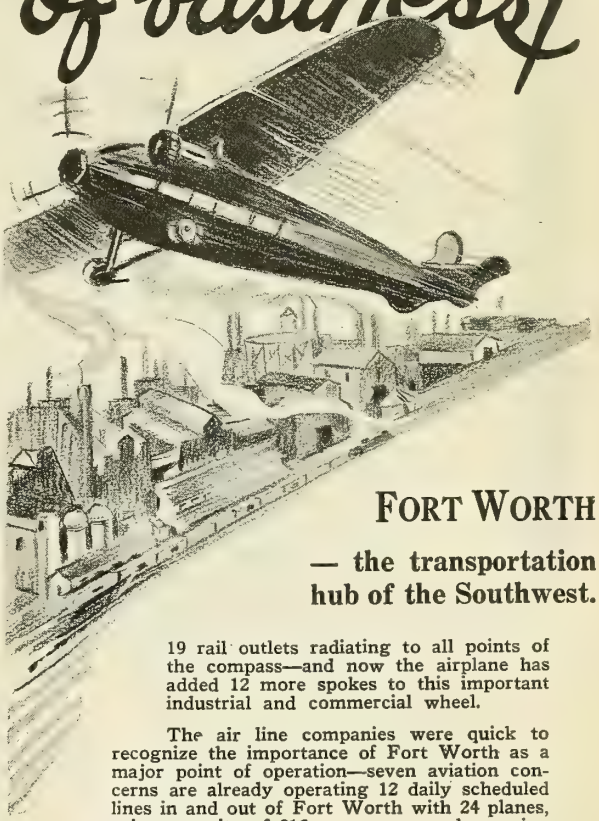
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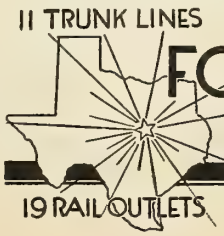
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The aviation industry will quickly appreciate these advantages — as have other lines of manufacturing — and Fort Worth will soon add this industry to its items of leadership.

Engineering reports and any other desired information will be gladly supplied from careful, unbiased research.



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(*Continued from preceding page*)

border passenger service, operating from Phoenix to Tucson to Nogales, and Hermosillo, Mexico.

Its flying equipment consists of twenty-one planes of various types, several private airports, and considerable ground equipment.

The Grand Canyon tour consists of a fifty-mile trip in trimotored twelve-passenger planes over the canyon, the Painted Desert and other scenic points in the vicinity.

Delta Air Service

Delta Air Service operates a daily air passenger service between Birmingham and Shevreport, Louisiana, and a tri-weekly service between Birmingham and Dallas. On the Dallas extension, planes operate on alternate days, so that a plane is going in one direction each day.

Six-passenger cabin planes are used.

Corporacion Aeronautica de Transportes

Corporacion Aeronautica de Transportes, usually referred to as C.A.T. or C.A.D.T., in operation slightly more than one year, has grown from a company flying three planes 300 miles daily to an organization operating fourteen planes flying 4,200 miles daily. Ten pilots fly the Lockheed Vegas used by the company, which serves sixteen Mexican towns and Brownsville and El Paso in Texas.

Most important of the company's many lines is the 1,100-mile El Paso-Mexico City route which is negotiated in nine hours. The company's lines intersect with Pan Americans Airways and S.A.T. at Brownsville, and with S.A.T. and Standard Airlines at El Paso.

International Airways, Inc.

International Airways were recently organized at Brownsville, Texas. The company plans to operate two planes a day between Brownsville, Texas, and Kansas City. Further plans are as yet indefinite.

In the concluding part of this article, to appear in the September issue of AERO DIGEST, *Mr. Svehla discusses the principal airports, schools, aircraft and engine manufacturers, and miscellaneous operators in the Southwest territory.*

EDITORIALS

(*Continued from page* 51)

and it found a way even to give it to Benny Mendez, erstwhile Curtiss Field gas boy, for an unimpressive flight between New York and Colombia which was featured by nothing save the number of times he cracked up.

If Congress can let down the barriers in these cases,

(*Continued on following page*)



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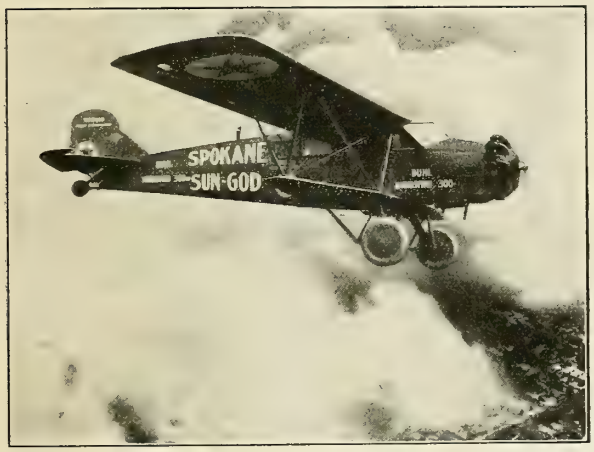
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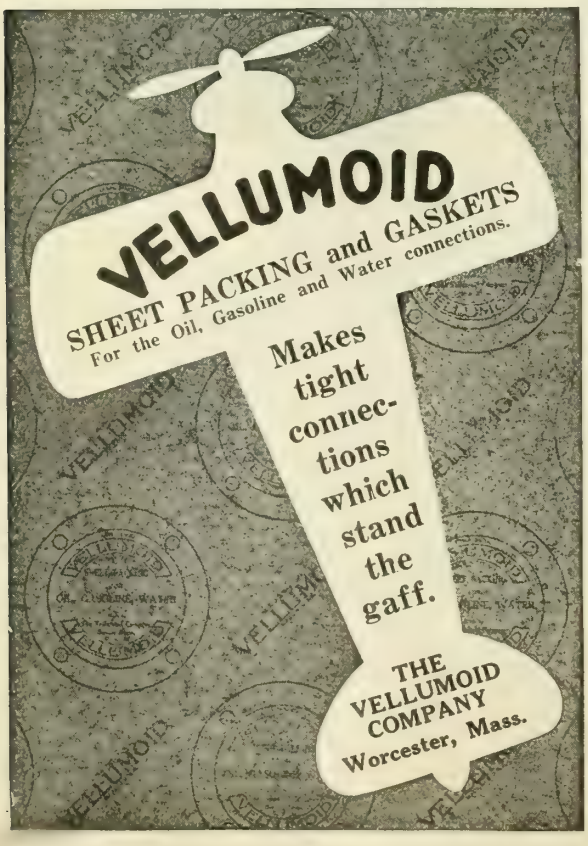
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(*Continued from preceding page*)

why can't it lower them to honor those American fliers who deserve recognition, however belated, from the country to which their feat has brought added glory?

GLENN HAMMOND CURTISS

THE youth of the air industry is again dramatically emphasized by the fact that in the span of the late Glenn Curtiss's distinguished existence nearly its entire history so far has been included. He was one of a group of actual pioneers numbering in all less than a dozen. Thus always is humanity dependent upon the efforts of a few.

Many ranked Glenn Curtiss next to the Wright brothers for his contributions to the art and industry of human flight. He was self-made in that he had not many of the so-called advantages of formal education and none of those of early family wealth.

He was a thinker, a doer and one of those rare individuals in whom inventive genius combined with business sense. In his unexpected death at Buffalo last month not only the aeronautical industry, but the whole world, loses one of its most prolific workers in the cause of scientific progress.

EDUCATING THE PUBLIC

A BROCHURE lies before the writer telling of the campaign by the Wright Aeronautical Corporation, through Pedlar and Ryan, to overcome on behalf of the air industry the obstacles to development in its instance which invariably have handicapped all new modes of transportation in the past.

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(*Continued on following page*)

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FLIGHT TO BERMUDA

(*Continued from page* 43)

northbound 93.86 knots ground speed, or 108 miles per hour. Our average fuel consumption southbound was twelve gallons per hour and northbound fourteen gallons per hour. We landed with a reserve of 120 gallons of gas in our tanks, sufficient to have remained aloft another ten or eleven hours of necessary. The air during the whole flight was exceptionally smooth. As far as the flight was concerned, it seemed little different to me than sailing in a fast surface vessel.

* * *

LETTER received by Roger Williams from a witness of his flight over the island and reporting the delivery of mail dropped from the *Columbia,* for delivery to the postmaster at Bermuda.

HOTEL BERMUDIANA
BERMUDA

Bermuda, 3:30 p.m., June 29, 1930.

Pilot Roger Williams and Crew.

Dear Friends:

The writer takes pleasure in informing you that he was the fortunate one to pick up the bag with its contents of mail dropped by you in the back yard of his residence in Woodlands, from the first plane to make a New York to Bermuda non-stop flight.

That this bag was dropped in this vicinity makes me feel quite honored, and I may say that it caused considerable excitement in this residential section. By coincidence I was on my porch talking on the subject of your flight and the fact that the airplane was due had just been discussed by my family. A short time later we heard the hum of your machine. We rushed into the yard just in

(*Continued on following page*)

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(*Continued from page* 182)

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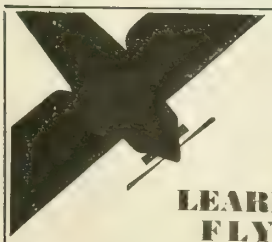

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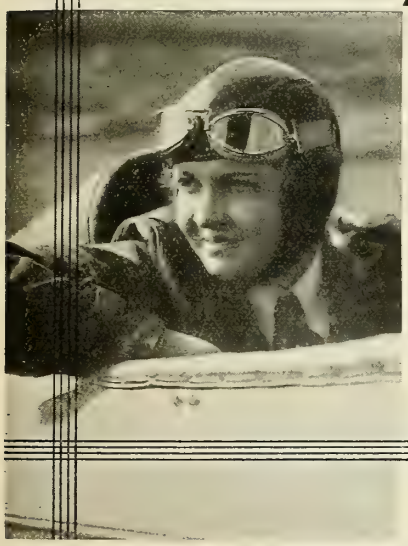
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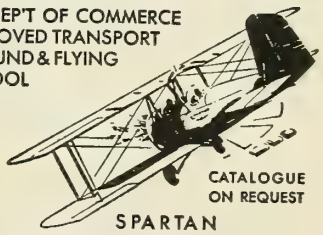
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IN this revision, Mr. Gregg was assisted by five meteorologists in charge of Weather Bureau Airport Stations, C. G. Andrus of Cleveland, H. M. Hightman of Salt Lake City, V. E. Jakl of Omaha, D. M. Little of Oakland and J. A. Riley of Atlanta. Chapters were also contributed by R. H. Weightman, Senior Meteorologist and District Forecaster, Washington, D. C.; R. N. Covert, Meteorologist, Instrument Division, U. S. Weather Bureau; and Lieut. F. W. Reichelderfer, U. S. N., Meteorological Officer, U. S. S. Los Angeles.

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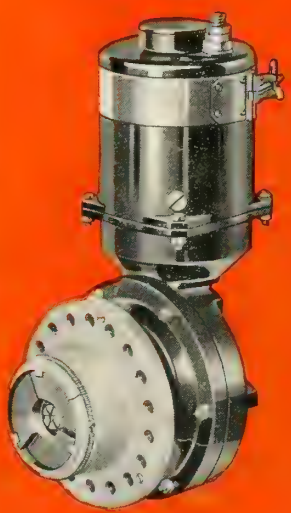
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